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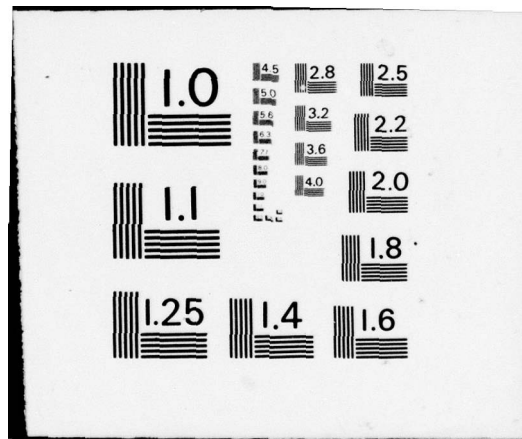
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July 1976

# Qualitative Constraints on Conventional Armaments

Volume II - Main Report and Appendices

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PREPARED FOR  
U.S. ARMS CONTROL AND DISARMAMENT AGENCY

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# Qualitative Constraints on Conventional Armaments

Volume II • Main Report and Appendices.

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ABSTRACT

This study is an investigation of the desirability and feasibility of placing qualitative constraints on conventional arms competitions by means of negotiated arms control agreements. Using an inductive and empirical approach, the study develops a conceptual structure for determining whether US arms control policy should pursue such constraints in particular situations. Past experience in arms control and the principal issues involved are surveyed with attention to qualitative aspects, and the evidence of the present importance of and motivations for qualitative weapon improvement is reviewed, adducing examples in five areas of arms competition. The utility of qualitative constraints is discussed in terms of identifiable objectives; feasibility conditions are indicated and the basic forms of control are specified and analyzed. Possible types of agreement embodying desirable and feasible constraints are examined and illustrated by four candidate agreements in major areas of arms competition. Conclusions are presented indicating the circumstances under which qualitative constraints would be both desirable and feasible.

PREFACE

Recent arms control negotiations have emphasized constraints on nuclear armaments and forces and, when they have dealt with conventional armaments, have tended to focus on quantitative limitations. With rapid advances in technology, increased ability to pay for modern weapons in areas such as the Middle East, and increased availability of modern weapons for export, several conventional arms competitions have taken on distinct qualitative dimensions as well as quantitative ones. The US Arms Control and Disarmament Agency therefore requested this study to (1) review past attempts to negotiate qualitative constraints as well as quantitative; (2) examine evidence of particularly intense qualitative competition and the apparent motivations for qualitative weapons improvements; (3) investigate feasible forms of control over qualitative weapons improvements; and (4) assess US security interests in supporting or promoting qualitative constraints in areas such as the NATO-Warsaw Pact balance, the Middle East, the Indian Ocean, and Latin America.

The report is published in two volumes. Volume I, the Summary, is a condensation of the Main Report, contained in Volume II. Volume II also includes supporting appendices. References to documentary sources are omitted from the Summary. Complete documentation is provided in the Main Report and its appendices.

The authors are indebted to LTC William Staples of the Military Affairs Bureau (formerly, the Military and Economic Affairs Bureau) of ACDA for his patience, support, and wise counsel in the conduct of this study and to Dr. Wolfgang Klaiber and Dr. Robert Harkavy for their careful reading of the draft report and their many useful suggestions for revision, correction, and expansion of sections of the Report.

This report could not have been completed without the tireless and skillful work of Mrs. Agnes K. Bedell and Mrs. Peggy H. MacDonald whose typing and retyping of the manuscript deserve special appreciation.

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ABBREVIATIONS

AAH	advanced attack helicopter
AALC	amphibious assault landing craft
AAM	air-to-air missile
ABM	anti-ballistic missile
ACDA	US Arms Control & Disarmament Agency
ACF	air combat fighter
ACV	air cushion vehicle
AGI	communications & instrumentation ship
AGOR	oceanographic research ship
AGS	surveying ship
AMIO	Arab Military Industries Organization
ASM	air-to-surface missile
ASMD	antiship missile defense
ASW	antisubmarine warfare
ATGM	antitank guided missile
AWACS	airborne warning and control system
BIOT	British Indian Ocean Territory
BMP	boyevaya mashina pekhota ("infantry combat vehicle")
BRDM	<u>bronirovannaya razvedyvatelnaya dozornaya mashina</u> ("armored reconnaissance vehicle")
C (or CA)	cruiser
CCD	Conference of the Committee on Disarmament
CENTO	Central Treaty Organization
CLGP	cannon-launched guided projectile
CV	aircraft carrier
CVA	attack aircraft carrier
DD	destroyer
DE	destroyer escort
DOD	Department of Defense
DRV	Democratic Republic of Vietnam
ENDC	Eighteen Nation Disarmament Committee
FAC	fast attack craft
FR	frigate
GCD	general and complete disarmament
GNP	gross national product
GPO	United States Government Printing Office
HEAT	high explosive, antitank
IISS	International Institute for Strategic Studies
ICRC	International Committee of the Red Cross

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JCS	Joint Chiefs of Staff
LF	light forces (naval, patrol boats, gunboats, etc.)
LOC	line(s) of communication
MBFR	mutual and balanced force reduction(s)
MBT	main battle tank
MICV	mechanized infantry combat vehicle
MIRV	multiple, independently-targeted reentry vehicle
MRCA	multi-role combat aircraft
MSC	miscellaneous
NATO	North Atlantic Treaty Organization
O&M	operations and maintenance
OPEC	Organization of Petroleum Exporting Countries
OSD	Office of the Secretary of Defense
PGM	precision guided munition
PHM	patrol hydrofoil missile (ship)
PLO	Palestine Liberation Organization
POL	petroleum, oil, and lubricants
PRC	People's Republic of China
QRA	quick reaction alert
R&D	research and development
RDT&E	research, development, test and evaluation
RPV	remotely piloted vehicle
SACEUR	Supreme Allied Commander, Europe
SALT	strategic arms limitation talks
SAM	surface-to-air missile
SEATO	Southeast Asia Treaty Organization
SESS	space event support ship
SIPRI	Stockholm International Peace Research Institute
SLBM	submarine launched ballistic missile
SOSUS	sound surveillance system
SS	submarine
SSBN	missile firing nuclear submarine
SSM	surface-to-surface missile
STOL	short take-off and landing
SVRS	space vehicle recovery ship
T&E	test and evaluation
TOW	tube launched, optically tracked, wire-guided (antitank missile)
UN	United Nations
UTTAS	utility tactical transport aircraft system
V/STOL	vertical or short take-off and landing

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### Chapter 1

#### INTRODUCTION

##### PURPOSE AND SCOPE

The purpose of this study is to investigate the desirability and feasibility of placing qualitative constraints on conventional arms competitions by means of arms control agreements.

The study is exploratory and conceptual. It does not assume that qualitative constraints are either desirable or feasible in general or in any particular arms competition. Rather, it identifies and examines the range and types of considerations and problems associated with assessing or judging the desirability and feasibility of any qualitative constraint on conventional armaments. In short, it seeks to structure the problem of determining whether US arms control policy should consider and pursue qualitative as well as quantitative constraints on particular conventional arms competitions.

##### BACKGROUND

It is frequently argued that arms competition, or "the arms race," in the technological era has become more qualitative than quantitative. There are three principal reasons adduced for this: first, there apparently are some inherent limits on the sizes of military forces that nations are willing or able to afford; second, advanced technology appears to be able to provide significant improvements in armaments almost without evident limit; and, third, there are obvious military advantages in being able to field forces with weapons that are superior in firepower, flexibility of employment, and sustainability to those of an opponent.

Qualitative competition in strategic nuclear forces — which have received relatively more emphasis in arms control policy and negotiations than tactical nuclear forces and conventional forces — has long been acknowledged in arms control studies and planning. Qualitative improvements in targeting, accuracy and reliability, range, yield-to-weight ratios, penetration, protection, and command and control are all recognized as factors of critical importance that must be taken into account in assessing and controlling the strategic balance. Many suggestions and unofficial proposals have been made in the arms control literature for directly curbing or constraining qualitative competition in nuclear armaments. In the nuclear area, qualitative constraints that have been negotiated include the Limited Test Ban Treaty, the Non-Proliferation Treaty, and the ABM Treaty.

In the area of conventional forces, arms control studies and policy have focused almost entirely on quantitative limitations on manpower, force units, and major armaments, as in the general and complete disarmament (GCD) proposals of the early sixties and in the mutual and balanced force reduction (MBFR) negotiations of the seventies. Qualitative improvements and qualitative competition in conventional armaments have been recognized to exist, especially in recent years since the high-intensity October War of 1973 and the Vietnam War, which saw the introduction of many technological devices. However, there are greater analytical difficulties in assessing how these affect conventional military balances and stability than in assessing the impact of qualitative improvements in strategic forces.

Whether and how qualitative improvements and qualitative competition in conventional armaments should (desirability) and could (feasibility) be constrained are the subjects of this study.

#### DEFINITIONS AND LIMITATIONS

How several key terms are defined and delineated establishes the general structure and limitations of the analysis. Working definitions were provided in the terms of reference for the study and adjusted and modified throughout. Sometimes the working definitions were expanded to avoid constricting the analysis; at other times they were contracted to avoid semantic bogs in which, for example, "desirability" and "feasibility" became almost indistinguishable. The definitions that are offered below reflect this process of seeking the most meaningful delineation of terms and are still working definitions. They are intended to alert the reader to the problems of structuring the analysis and establishing its limitations.

##### Conventional Armaments

Conventional armaments are defined by exclusion. They exclude nuclear weapons, chemical and biological weapons, and exotic "unconventional" technological possibilities such as lethal lasers. All other weapons or armaments of land, air, and sea forces are considered. The focus and emphasis is on armaments as such and directly associated equipment that affects the firepower, the employment flexibility, and the operational protection and sustainability of the armaments (e.g., tank armor, but not maintenance and logistics vehicles and equipment).

##### Qualitative Improvements

In keeping with the focus on armaments as such, qualitative improvements are considered to be any development that improves a weapons capability to deliver fire, to increase mission flexibility, or to improve

survivability or sustainability. Improvements are distinguished and assessed primarily on the basis of their military significance. The principal distinctions that are developed in this study are among improvements that appear to be "macrocosmically" destabilizing (threatening to give a decisive advantage to one side in an arms competition), those that appear to be "microcosmically" destabilizing (requiring matching or countering developments on other sides, thus, prompting a major change in their force planning and structure), and those that appear to be only "product improvements" (increasing the efficiency and effectiveness, but not requiring major offsetting reactions from other sides). Such distinctions are relative to existing military balances and competitions and not the technology of the qualitative improvements.

#### Qualitative Constraints

A qualitative constraint is understood broadly to mean any attempt to ban, limit, or otherwise control the development or introduction of qualitative improvements. The attempt derives from concern with the significance of the improvement and necessarily implies some concern with the potential magnitude of the introduction. Hence, a qualitative constraint cannot be separated from a quantitative constraint in any absolute sense. It is possible to conceive of constraints that are almost purely quantitative, aimed solely at controlling the amount of a given category of forces or armaments that would be permitted rather than the quality of forces or armaments in that category. Even here, however, the categories reflect some judgment about the characteristics or qualities that define the category. It is not useful and probably not possible to attempt to define a constraint that is only qualitative. A constraint that would ban a particular development is best conceived as a constraint that limits the quantity of the qualitative improvement of concern to zero. Thus, all qualitative constraints are understood to require some corresponding specification of a quantitative constraint.

#### Desirability and Feasibility

By the desirability of a qualitative constraint it is understood that some judgment must be made whether the constraint would serve some identifiable and useful objective. Desirability deals principally with the question of whether a qualitative constraint should be pursued in some particular context. Different viewpoints can, of course, be distinguished from which to judge desirability. The most obvious distinction is between competitors in an arms competition, but others can be made on the basis of military, political, and economic interests and factors within a state. Such distinctions can lead to the analytical breakdown in the difference between desirability and feasibility in statements like "that constraint is politically desirable but militarily infeasible, or infeasible to negotiate." To avoid such analytic and semantic problems, this study attempts to confine the primary judgment

of desirability to definable objectives that at least theoretically could be achieved by all interested parties and to confine feasibility to the judgment of whether a constraint can be operationally implemented, assuming it is judged desirable to some degree by all parties.

As indicated, particularly in such working definitions of "desirability" and "feasibility," there is need for exploratory and conceptual research and analysis to structure the problem of assessing whether and how qualitative constraints on conventional armaments should become a part of US arms control policy and negotiations.

#### APPROACH TO THE PROBLEM

This study adopts a rather simple and straightforward approach of attempting to structure the problem inductively and empirically rather than deductively and theoretically. It first surveys past attempts to negotiate arms control and infers some of the principal issues that have dominated concern with qualitative constraints within those attempts (Chapter 2). It next surveys the evidence that qualitative aspects of arms competition have become important in the present era. This includes: examination of the factors, trends, and motivations that appear to stimulate qualitative improvements; the cost in resources that states appear willing to commit to qualitative competition; and the characteristics of principal competitions between the US and USSR, between NATO and the Warsaw Pact, in the Middle East, in Latin America, and in the Indian Ocean (Chapter 3 and the Appendices). It then examines the potential utility of qualitative constraints in a broad framework, informed by but not specific to the competitions described. Preconditions of negotiability that circumscribe desirability are examined, and desirability is then discussed in terms of identifiable, operational objectives of qualitative constraints. Considerations affecting feasibility are introduced (Chapter 4). The feasibility of implementing a qualitative constraint is then discussed in the framework of the basic forms that control may take (Chapter 5). The types of agreements in which a qualitative constraint that is potentially desirable and feasible may be developed are then examined broadly and illustrated in candidate agreements for each of the areas of arms competition examined earlier (Chapter 6). Conclusions deriving from the inductive exploration are formulated in the final chapter (Chapter 7).

Chapter 2

THE HISTORICAL SETTING: DOMINANT ISSUES

GENERAL

Past attempts to negotiate arms limitations, including qualitative arms constraints, can be placed within three general periods: the years prior to the outbreak of World War I in 1914; the end of World War I to the onset of World War II in 1939; and the post-World War II period up to the present. Each period was characterized by a series of attempts by major powers, often joined by numerous smaller states, to regulate, limit, or ban certain or all armaments. These periods are distinguished by distinct differences but also contain some similarities of approach to the problems of arms control (Refs. 1-6).

The international political structure differed markedly among the three periods. The first was a period of post-Napoleonic, European great power rivalry and colonial imperialism while across the Atlantic the United States was just assuming a world power role. The second was a transitional time in which new nationalist movements began to exert pressure for autonomy or independence from colonial status, communism took root in Lenin and Stalin's Soviet Union, and the expansionist policies of Italy, Japan, and Hitler's Germany raised new threats to world order. The third period opened with the bipolar confrontation of power and ideology between the United States and the Soviet Union and their respective allies of "West" and "East," saw the rise of a second major communist power in the Peoples Republic of China which was often to be hostile to both the US and the USSR, and included the breakup of the old European colonial empires into scores of new nations in Asia and Africa.

Although the Permanent Court of Arbitration came into being during the first period there was no established international body such as the League of Nations or United Nations in which much of the arms control and disarmament studies and negotiations of the second and third periods were focused. The third period was sharply set apart from the first and second by the advent of nuclear weapons. This was a quantum change that overshadowed the development of military aviation and all other advances in weaponry and delivery means since the turn of the century. Efforts towards arms control or disarmament from 1945 onwards were governed by the overriding nuclear concern, while conventional arms limitation was considered separately from or, later, jointly with that dominant issue in a much subordinated role.

Prevailing attitudes toward the goals of arms control differed from one period to another. In the first, principal efforts were directed

towards the limitation but not elimination of arms and arms technology, and the recurrence of war from time to time was generally regarded by statesmen as inevitable. During the second period, after "the war to end war," proposals for limitation and specific controls were not absent, but the goal of general and complete disarmament (GCD) as an obligation of civilized humanity to do away with war as a means of conflict resolution became a main theme. In the third period, several themes successively appeared: destruction and banning of nuclear weapons as the principal menace to humanity; renewed consideration of the goal of general and complete disarmament now described as a "necessity" in view of nuclear weapons; and then a turning away again from GCD and back to less-utopian negotiations aimed at quantitative and qualitative limitation of particular armaments.

Despite the changes in international political structures and the advances in military technology that occurred after 1900, the resemblances between the three periods in approaching and attempting to solve the problems of arms control are as noteworthy as the differences. All three periods are characterized by expanding military technologies and forces ("arms races") that both motivate and frustrate attempts to control or limit them. Similar perceptions, pro and con, of the desirability of controls recur, arising from considerations of national security, international stability, other foreign policy objectives, or costs. Similar lines of thought and analysis are followed, similar difficulties are encountered, and similar types of solutions have historically been proposed, attempted, or rejected.

Arms controls or limitations that were adopted in these periods came about through three general means: by imposition of victors' terms on the vanquished, as at the end of both World Wars; by voluntarism, including unilaterally adopted controls and the subscription by individual states to international documents such as the various Geneva conventions or the Non-Proliferation Treaty; and by negotiation between two or more states acting on individual or shared national interests. Sometimes such controls, both quantitative and qualitative, have been included in supporting conventions attached to treaties or agreements whose primary purposes were other than the limitation of arms.

Negotiated control measures in all three periods generally consisted of three main elements: an agreement on what was to be controlled, a means — stated or implied — of verification, and a procedure — again, stated or implied — for enforcement or for sanctions in case of violations. The elements of verification and enforcement inevitably gave rise to a range of considerations from world government and an international police force to trust and unilateral abrogation. In those cases, such as the Kellogg-Briand Pact of 1928, in which no means was provided for verification and enforcement, parties to the agreement relied on their own intelligence services for verification and a variety of unilateral enforcement actions. These included such possible steps

as appeals to world opinion or arbitration, abrogation of the agreement and resumption of the arms race by the offended state in its turn, severance of diplomatic relations, or finally, waging war either singly or along with like-minded allies against the violator.

Of all the factors common to the history of arms control and disarmament attempts in all three periods, the most powerful and persistent have been political rather than technical. The earlier periods show how governments have endeavored to associate themselves with the high moral goals of arms control and disarmament, while often simultaneously making strenuous efforts to gain qualitative and quantitative advantages themselves and taking any possible measures to prevent potential opponents from obtaining such advantages through disarmament or limitation agreements. Questions of strategic necessities and the requirements of strategic balance in earlier times seem simple in scope by comparison with the present time. The statesmen of earlier years, however, addressed the questions of national security, survival, and power competitions in light of the strategic weapons, forces, and economies of their own times, and many of the devices and proposals then developed continue to have relevance and will, with modifications, have to be reexamined today.

The history of arms control and disarmament agreements has been conveniently surveyed in a booklet published in February 1975 by the US Arms Control and Disarmament Agency (Ref. 7), along with the texts of and comment on existing international agreements, and may, of course, be found in detail in the extensive literature on the subject. The purpose of the present selective review of the past is to highlight continuing issues and to point up factors of motivation and desirability in earlier experience, particularly regarding qualitative aspects of arms and arms control efforts.

#### PRE-WORLD WAR I EXPERIENCE

Numerous examples of arms control or disarmament by victor's imposition can be found in history running back to ancient times. Attempts to attain these ends by negotiation, however, follow the rise of national states, the full development of the doctrine of secular national sovereignty, and the developments in military technology that resulted from 18th century scientific breakthroughs and the industrial revolution that followed in Western Europe and America. Among the European powers, early and unsuccessful proposals for arms limitation were made after the Seven Years War of 1756-63. A half-century later, in the post-Napoleonic settlement at the Congress of Vienna in 1815, Tsar Alexander I of Russia raised the question again, but without favorable response. Russia, although possessed of the advantages of vast land area and manpower, was at a serious countervailing disadvantage in technology and industry by comparison with the powers of Western Europe. In 1831 and

again in 1863 France, for reasons of both internal and external policy, made some suggestions for arms limitation negotiation, but no action resulted.

Besides sporadic attempts to limit the introduction of new armaments or to reduce current holdings, the nineteenth century included several efforts to revive and strengthen even more ancient attempts to establish customs, codes, or laws for the conduct of war. These included such matters as the taking and handling of prisoners, treatment of non-combatants, disposition of property in captured territories, and even concern about weapons that might cause unnecessary suffering or produce indiscriminate collateral effects. While not the primary focus of this study, efforts to regulate the conduct of war by customs, codes, and laws respecting particular weapons effects do deal with qualitative constraints on weapons uses. Four nineteenth century efforts are noteworthy in this respect and are precursors of similar efforts in the interwar period and the post-World War II period. These are: the Declaration of Paris of 1856, signed by fourteen governments, which did much to clarify the law of maritime war; the Lieber Code of 1863, promulgated by the United States to govern the conduct of armies in the field, which had wide influence in Europe; the Red Cross or Geneva Convention of 1864, signed initially by twelve governments and later accepted by others, which did much to ameliorate the treatment of wounded prisoners and to protect medical facilities; and the Declaration of St. Petersburg of 1868, signed by sixteen European states and Persia, which inter alia renounced the use in war of projectiles (bullets) less than 400 grams in weight with explosive or incendiary charges (Ref. 8).

Another concern, of increasing importance in the last quarter of the twentieth century, also appeared toward the end of the nineteenth century. This was the interest in controlling the international transfer of arms. As a part of the Brussels Act of 1890, which was aimed primarily at the suppression of African slave trade, thirteen European and four non-European states including the US agreed to prohibit the introduction into the central region of Africa (except with effective guarantees against "misuse") of any arms and munitions other than flintlock guns and the necessary black powder. The constraint lasted until the World War I period — perhaps, partly because the region covered (20° N latitude to 22° S) excluded the principal areas of European interest, investment, and control in Africa (Ref. 9).

Of the three nineteenth century concerns — limiting national inventories of armaments, regulating the conduct of war, and controlling the transfer of weapons — the second led most directly to the opening of the modern era of arms control negotiations, although that concern has been overshadowed in many ways by the other two concerns. The Declaration of St. Petersburg set the tone for the modern era in its attempt to fix "by common accord the technical limits within which the necessities of war ought to yield to the demands of humanity"

(Ref. 8, p. 192). The first Hague Conference of 1899 on the "pacific settlement of international disputes" continued this concern and formally opened the modern era by joining it to the concern with armaments inventories.

#### The First Hague Conference

Attended by representatives of twenty-six nations at the Hague in 1899, the first Hague Conference came about at the initiative of Tsar Nicholas II of Russia, whose rescript of proposal to the diplomatic corps at St. Petersburg set the high moral tone that would be a hallmark of most negotiations thereafter:

In proportion as the armaments of each Power increase, so do they less and less fulfill the object which the Governments have set before themselves. ...It appears evident that if this state of things were prolonged, it would inevitably lead to the very cataclysm which it is desired to avert, and the horrors of which make every thinking man shudder in advance (Ref. 6, p. 79).

The objects of the conference in the Tsar's view, were to be those of attaining a lasting peace and, above all of limiting the progressive development of existing armaments. In terms of national security and interest, the Tsar and his ministers saw clearly that the Russian financial, technological, and industrial status was distinctly inferior to that of Great Britain, France, and Germany, and that continued military development by them could only leave Russia increasingly disadvantaged. In terms of weapons perceived as possibly decisive in the hands of an opponent, the principal Russian weakness, both quantitatively and qualitatively, was its deficiency in the vastly improved forms of artillery now becoming standard in the forces of the leading powers of Western Europe. Although product improvement had taken place and some innovations had been made, no breakthrough or widely standardized major improvement in armaments had occurred for 150 years or more before the American Civil War. During the second half of the nineteenth century, however, the development of land and naval weapons and the prospects of further development had grown apace. Steam and armor replaced sail and timber at sea. For both land and naval warfare, the metallurgical processes for reliable rifled cannon admitting of high chamber pressures had become known, along with breech loading, on-carriage recoil systems, and, in 1887, the new stable, smokeless, and progressive-burning propellant. The famous "French 75" field piece appeared in 1897.

The first Hague conference failed to secure agreement for the limitation of important arms development, production, or size of forces. Germany, newly unified and overwhelmingly victorious in the Franco-Prussian War of 1870, in particular resisted reduction of weapons and

forces. Conventions were adopted for the regulation of customs of war (including prohibition of the use of poisons or poisoned arms and any arms causing "superfluous injury") on land and at sea and for establishment of the Hague Permanent Court of Arbitration (later, the International Court of Justice). Three separate declarations were also accepted. These prohibited discharge of projectiles from balloons, military diffusion of asphyxiating gases, and use of expanding ("dum-dum") bullets. (The United States did not ratify the latter two declarations.) However useful these conventions and declarations were in codifying international law and moral judgments, they did nothing to arrest the intensifying European arms competition either qualitatively, as shown by continuing arms development, or quantitatively, as seen in the size and composition of forces (Ref. 8).

The deliberations of the first Hague conference directed at arms control revealed a number of issues, even though in rudimentary form as compared to later complexities, that would continue to affect the course of arms negotiations in the twentieth century.

1. Qualitative as well as quantitative military disadvantages could now influence a nation to seek negotiated arms limitations. On the other hand, nations possessing distinct qualitative advantages were unlikely to limit or give them up if uncompensated advantages were thereby conveyed to other states and the existing power relationships changed. That is, those who are ahead want to stay that way; those who are approaching equality or superiority are unlikely to endorse changes that may prevent attainment of such goals; and those who are far behind, while simultaneously invoking moral principles, are impelled to seek allies and join the arms competition.

2. The changes in artillery and naval armaments in the second half of the nineteenth century were so great as to constitute technological "breakthroughs." Although categorical distinctions between offensive and defensive weapons were not attempted at the Hague Conference, it had become clear that a major state possessing the new weapons as its standard issue would enjoy enormous and possibly decisive advantage in offensive operations against a state that did not have them, and these advantages — in weapon reliability, range, accuracy, lethality, and rate of fire — were so great as to preclude their being offset by an opponent's quantitative superiority in the older weapons. Sensitivity to the recent advances in science and technology and a comprehension that more new weapons breakthroughs might be imminent was indicated in the prohibition against discharge of projectiles from balloons or "other new methods of similar nature."

3. Concern for reducing the suffering of war — that is, a humanitarian interest preferring that war's victims should be killed

cleanly rather than by inhuman, uncivilized, and barbarous means — was shown in the qualitative prohibitions against gas warfare and dum-dum bullets. Here, however, a convenient marriage of high moral stance and self-interest may be perceived on the part of all concerned. Neither gas warfare nor, certainly, dum-dum bullets were seen as likely to be strategically decisive in view of the new land and naval armaments mentioned above. Nothing was lost by anyone in banning these messy, minor harassments. On the contrary, their exclusion permitted the negotiators to demonstrate agreement and to assume a degree of politically attractive moral sanctity. The nature of these prohibitions and the circumstances in which they were generated present the first example in modern arms negotiations of the proposition that agreement may be secured with relative ease to limit or ban weapons, techniques, or areas that nobody wants anyway and whose utility can be more effectively attained by other means.

4. The emphasis on the financial burdens of armaments expressed in the Tsar's call for the conclave point up another issue of continuing relevance in arms negotiations — the issue of military costs. Presumed cost savings — without loss of relative international advantage — from arms control make negotiated limitation economically desirable to any government. They have the added political benefit of heralding negotiated limitations as permitting reduction in taxes or progress in peaceful pursuits or both. Conversely, later proposals of ways to bring about arms controls or disarmament frequently include budgetary constraints as one of the means. Agreements to reduce budgetary allocations for personnel, for example, might reduce the size (numbers) of forces; agreements to reduce allocations for research and development or expenditures for certain weapons might produce qualitative constraints (Ref. 6).

#### The Second Hague Conference

The second Hague Conference, attended by representatives of 44 nations in 1907, also failed to establish any significant limitation of arms and forces. Areas of conference agreement lay chiefly in the field of international law, procedures for pacific settlement of disputes, and further codification of customs of land and sea warfare. A convention prohibiting deployment of automatic submarine contact mines was accepted, and the declaration of 1899 against discharge of projectiles from balloons was renewed. The prohibitions against war gas and expanding bullets, however, were not renewed. The United States had failed to ratify these declarations, on grounds of limitation of sovereignty and internal politics, and this opposition made it easier for others to fall off (Refs. 4-8).

The conference delegates in their final act unanimously declared in favor of the compulsory arbitration of disputes, and, in the form of

resolutions, proclaimed eleven *voeux*, or wishes, mostly related to matters of personal status in war that had not previously been codified in conventions of this or the previous conference. The declaration on compulsory arbitration found easy agreement, since it was cast at a high level of generality and lacked specific undertakings for enforcement. The Hague conferences failed to control armaments, according to many observers then and later, because of the prevailing attitude that war was inevitable and main attention was accorded to its regulation by legalized procedural means.

Perhaps the most instructive aspect of the second Hague Conference period in regard to particular weapons constraints lies in the negotiations on naval armaments. Great Britain, then well ahead in naval power but hard pressed by Germany, offered to freeze the naval status quo and even to scrap some ships; but Germany rejected this proposal. In 1906, Great Britain had commissioned HMS Dreadnought, whose name became popularly used to describe ships of this size for the next several decades. At 21,845 tons, 21 knots, and with ten 12"x45 guns, HMS Dreadnought confronted the navies of the world with characteristics of design, armor, size, speed, and firepower never before seen. This first British dreadnought made obsolete the existing German naval line of battle — and most of the British navy, too. Patriotic fervor welled-up, and Dreadnought was energetically debated with the Conservative Party's 1909 phrase, "We want eight, and we won't wait!" used to overcome the Liberal Party's opposition. The British government's decision to build dreadnoughts, promoted by Admiral Lord Fisher, relied heavily on the judgment of military necessity. Later opinions, however, judged this quantum leap forward in battleship capability to have been a strategic mistake for the British. It put the naval race on a level where Germany could compete far better than if it had accepted the offer to freeze the status quo or if the German admirals, lacking the German public's counter-response to Britain's introduction of the dreadnought, had had to compete only by increasing the quantity, rather than quality, of their naval armaments (Refs. 6, 10).

The European arms race intensified, and British Foreign Secretary Grey told the House of Commons in 1909 that the one thing more favorable than any other for the prospects of peace "would be that the naval expenditure in Germany would be diminished and that ours was following suit" (Ref. 6, p. 79). No limitation on new battleship building and other force expansion came about, as the rival nations and their alliances fumbled their way into World War I. Germany, intent on power, trade control, and colonial empire, endeavored — literally and figuratively — to break out of the Baltic and out of Europe to dominance of the Atlantic Ocean areas and beyond, but was contained by the British strategic victory at Jutland, where the British naval supremacy was at last reasserted.

Two observations applicable to arms competitions then and later are suggested by the dreadnought example.

1. The question of whether the British should or should not have built the new battleship is moot. Because of a combination of reasons — prestige and pride, availability of a design and the capability to produce it, and perceptions of threat to the empire and the established political order — they did it, thereby asserting a major advantage and materially displacing (disturbing) the European and world power ratios.

2. The unilateral introduction of a qualitative breakthrough in weapons seen to be potentially decisive in offensive operations may have the effect of intensifying arms competitions and goading opponents, who have the technical-industrial capability to do so, to respond quickly in kind.

#### INTER-WAR EXPERIENCE, 1919-1939

The experience of World War I, with the unprecedented destruction and casualties that were compressed within its four years, largely shaped the philosophy of and approach to arms control during the inter-war period. The Versailles Treaty, ending the war with Germany, illustrated the oldest form of control: the imposition of quantitative and qualitative constraints by victors on the vanquished. Seeking to punish Germany as the war's aggressor and to establish security by preventing a resurgence of German militarism, the Allies, in Part V of the treaty, directed the abolition forever of the Great German General Staff and specified the organization and maximum strength of the German armed forces. The total German military strength was fixed at 100,000 and all fortifications were prohibited in a zone 50 km east of the Rhine River. The manufacture or import of tanks or other armored vehicles was prohibited, as were submarines, aircraft carriers, mobile artillery of more than 105mm in caliber, and poisonous gases. All military aircraft, except for 100 seaplanes for coastal patrol and mine search, and dirigibles of any kind were prohibited. The navy was limited to six battle cruisers and six light cruisers — none to be over 10,000 tons displacement and to 12 destroyers and 12 torpedo boats. The weapons and systems thus prohibited and limited indicate clearly what types the Allied victors considered to be important (Refs. 1, 4-6, 8, 11-13).

#### The Washington Conference of 1921-22

Although the United States did not join the League of Nations, it took the initiative in seeking postwar armaments stability among the wartime Allies by convening the Washington Conference of 1921-22. This conference dealt with arms limitation in all media but was successful only in arriving at agreed naval ratios of tonnage and main armament

calibers in capital ships exceeding 10,000 tons each. These ratios for the five signatory powers, namely, the United States, Great Britain, Japan, France, and Italy, were respectively 5, 5, 3, 1.75, and 1.75. A "naval holiday" of eight years was also accepted to precede the building of replacement capital ships in the agreed total tonnages. In the following decade, the Washington Naval Treaty was widely acclaimed as deterring or at least delaying an incipient naval race between Great Britain, the United States, and Japan. At a follow-up conference in Geneva called by President Coolidge in 1927, Britain's Lord Jellicoe advanced a doctrine of "absolute requirements" based on existing imperial sea lanes that would have, in fact, allowed Great Britain an increase of about 220,000 in naval tonnage. The doctrine was rejected and the conference failed. A conference at London in 1930, however, established agreed ratios in naval ship classes of less than 10,000 tons and extended the capital ship building holiday until 1936. Only the United States, Great Britain, and Japan participated in the 1930 treaty, however. At the 1935 follow-on conference in London, the Japanese delegation withdrew, and all naval limitations, qualitative and quantitative, then ceased (Refs. 6, 14, 15).

At the Washington Conference of 1921-22, contemporary observers thought that valuable technical assessments had been made in the problems of balance among the land and air forces of the participants. No solutions that were politically acceptable, however, were found in these media. The naval ratios limiting capital ships received agreement for at least four reasons of a mixed military, political, and economic nature:

1. The naval forces of Germany, the formidable common enemy of the late war, were, along with all its other forces and military production, effectively emasculated. Heavy naval rebuilding by Germany, in violation of the treaty, would be a lengthy and expensive process and impossible to conceal.

2. The competing, signatory powers of the Washington treaty found the agreed proportions of capital ship strength compatible with their strategic and economic interests and responsibilities.

3. Of all categories of weapons platforms, ships are easiest to detect and count; and of all war vessels by far the easiest for intelligence services to identify and keep track of were battleships. The question of inspection or verification, therefore, was not a serious impediment to agreement on the ratios.

4. Agreement was fostered in some degree, especially among the lesser participants, by the growth of arguments holding that the airplane and submarine had made the battleship obsolete or, at least, had diminished its paramount strategic role at sea.

During the war, German submarines had taken a heavy toll of Allied naval and merchant shipping, and the submarine was widely given the opprobrium of inhumanity. Barbarous undersea sneak attacks were not in the noble, high traditions of Admirals Nelson, Dewey, et al. At the Washington Conference, Great Britain advocated banning the submarine but to no avail. France, preeminently the continental power whose large army was now again the dominant land force in Europe, had lesser resources for the naval mission and refused to give up the submarine, a powerful weapon much cheaper than the battleship and one whose improvement potential was great.

#### The Geneva Protocol of 1925

The use of lethal gas during the war, introduced by Germany in April 1915 at the Second Battle of Ypres and thereafter employed by both sides, had caused extensive casualties and had magnified the difficulties of military medical support. Although gas had not been strategically decisive, its potential for the future was now conceivably enormous. More than the submarine, gas was viewed as an inhuman means of war as it had been since the early days of the first Hague Conference. Now the ominous implications of a mass casualty weapon and population attacks could be seen. Efforts supported by the United States at the Washington Conference to ban gas warfare did not succeed, however, ultimately because the prohibition of gas was made one part of a treaty convention that also included prohibition of the submarine, and French ratification could not be secured.

Wide international agreement, qualified in some cases, prohibiting the use in war of gas and bacteriological weapons was attained in the Geneva Protocol of 17 June 1925 (finally fully ratified by the United States on 22 January 1975). For a combination of reasons, the later antagonists of World War II had refrained from the use of gas, and their apparent mutual deterrence subsequently was cited to support the "cancellation theory" hopefully advanced by some to cover nuclear weapons. In any case, aside from the category of imposed controls, the naval limitations that prevailed from 1922 to 1935 and, with a few exceptions, the non-use of gas in war after 1918 stand as the most successful examples of qualitative weapons constraints between 1899 and the Limited Test Ban Treaty of 1963 (Refs. 4-8).

#### Efforts by the League of Nations

Both the naval ratios and the protocol against gas and bacteriological warfare were established in multinational forums outside the League of Nations. After 1919, however, the most intensive and sustained efforts — and the most unsuccessful — towards arms control and disarmament took place within that unique new international body. The Treaty of Versailles of 28 June 1919 had incorporated the Covenant of the League

of Nations adopted by the victorious allies two months earlier. The treaty provided that "the maintenance of peace requires the reduction of national armaments to the lowest point consistent with national safety and the enforcement by common action of international obligations," and stated elsewhere that the imposed disarmament of Germany should be preliminary to worldwide reduction of armaments. As the League's functioning developed in its early years, a broad attitude, or philosophy, emerged that rejected the old realpolitik concept of war as inevitable, favored the concept that general disarmament was possible, and pursued this goal as the means to general peace (Refs. 1, 4-6, 8, 11, 13, 16).

Three stages characterized the League's efforts. From 1920 to 1925, chief attention was directed to the paramount problem of establishing security by political and legal means — a course favored by France — through definitions of aggression, systems of arbitration, and treaties of mutual assistance against aggression, all of which failed of adoption. The League's Temporary Mixed Commission reported, however, that nothing could be done to constrain or do away with land armaments until security against aggression was assured. The "chicken or the egg" dilemma of which had to come first — reduction of tension or arms control — was thus apparent, and was debated from both sides.

The years from 1925 to 1932 were those of the Preparatory Commission for the General Disarmament Conference. Attention now turned to technical calculations of equivalence under the seemingly logical proposition that if formulae were developed for equating qualitative effectiveness of weapons and forces, the application of quantitative factors would then enable standardized equivalence conditions to be determined. Reductions of all nations' armed forces by some common percentage could then be made without disturbing the existing power ratios or altering the relative security situation in any way, and the millenium would be in view. Voluminous studies were made, but no agreement was reached on equivalence factors and systems. In short, the participant states sought to keep and maximize their own advantages, while diminishing the advantages of others. Later theories of protecting stability with retaliatory capacities were anticipated by France's insistence on retaining submarines and Great Britain's insistence on retaining bombardment aircraft for such purposes.

No agreement having been reached in the pursuit of security by political means or of arms control by the technical means of calculated equivalences, the Preparatory Commission turned to a new principle, advocated particularly by Great Britain: prevention of aggression by differentiating between offensive and defensive weapons, and prohibition of the former. The rationale, again apparently logical and retaining its advocates to the present time, held that if weapons of significant offensive capability were banned and if nations deployed only arms that

were primarily defensive in nature, all would be secure. Aggression would become irrational, since it could not succeed against the greater power of the defense.

Capital ships, including aircraft carriers, of more than 10,000 tons, submarines, bombardment aircraft, poison gas, tanks, and heavy mobile guns were most often cited as offensive in character. Proposals for quantitative reductions in military manpower and budgets accompanied much of this discussion.

Under the auspices of the League, the General Disarmament Conference held at Geneva in February 1932, was attended by representatives of 60 nations. Here, the efforts to hone the distinction between offensive and defensive armaments reached their peak. A participant in and historian of arms control negotiations after both World Wars, P. J. Noel-Baker, has written that:

There was one principle of conventional disarmament which was ultimately accepted by almost all of the sixty governments... This was the principle of qualitative disarmament. It applies to naval and land and air armaments alike, and is of dominating importance in any consideration of conventional disarmament (Ref. 6, p. 392).

"Qualitative disarmament," according to Noel-Baker, was "the phrase adopted between the Wars to describe the abolition by international agreement of weapons which help attack against defense."

Although the principle of qualitative control received wide agreement, or, at least, lip-service as the guiding rationale, the determination in practice of which weapons fell under each of the two categories proved far more difficult. As the General Conference got underway, tentative classifications of offensive and defensive arms, advanced in the Preparatory Commission's work, now seemed less clear or non-viable. The prohibition and scrapping of submarines was unsuccessfully proposed in exchange for the prohibition and scrapping of battleships. Great Britain's Admiral Pound, disagreeing with many in the British delegation, insisted adamantly that it was impossible to classify the battleship as clearly offensive or defensive (Refs. 6, 17).

As the qualitative debate raged on, the positions of the negotiators often seemed to depend on who had most of which categories of weapons, and who would lose a present or future capability under alternative arrangements. Among the detailed studies prepared and presentations given, an interesting example (out of many) may be noted in the attempts to classify artillery. A qualitative distinction was introduced separating cannon into offensive and defensive categories at the caliber of

105mm. It was agreed that guns of that caliber or less were effective chiefly against lightly protected personnel and the least defended battlefield areas, while those of greater caliber were adjudged to be effective against defensive works. If this proposition were accepted, it necessarily followed from the guiding offensive/defensive rationale that cannon of more than 105mm should be prohibited and the matter of artillery would thus be solved.

United States' President Herbert Hoover put before the Conference in 1932 a comprehensive plan for reducing all armed forces by 30 percent, including the staged abolition of offensive air and land weapons and severe reduction of naval armaments, all of which were specified. In March 1933, Great Britain's Anthony Eden advanced the British Draft Disarmament Convention deferring naval negotiations for two years but providing for the abolition of artillery over 105mm in caliber; tanks over 16 tons, with full abolition to follow; poison gases, incendiaries, and bacteriological weapons; and aircraft over three tons empty weight. The Draft also prohibited aerial bombardment. During the conference, Britain proposed drastic limitations on military manpower and the transformation of Europe's continental armies into short-service militia forces. The latter proposition had a distinctive qualitative aspect consistent with the prevailing rationale, for it included the idea that such militias, because of their lack of training, would be incapable of conducting offensive actions (Refs. 6, 15, 17).

None of the above studies, proposals, and conventions succeeded of final adoption, although some historians have claimed that the British Draft Convention would have passed had it been submitted six months sooner and pressed harder. In fact, the General Disarmament Conference exhausted itself in frustration. French fears and demands for an international security system ("police force") could not be reconciled with German demands for equality. German representatives maintained that some fifteen years had passed since the end of the war, that the general disarmament undertakings by the Allies in the Versailles Treaty had not come about, and that German rearmament would thus be no more of a violation of the treaty than the allies' failure to disarm. Germany demanded, therefore, that other nations reduce themselves to the German level, or that constraints be removed from German rearmament.

The conference adjourned in July 1932, having attained limited agreement that air attack against civil populations should be prohibited, that artillery and tanks ought to be limited in size, and (reaffirming the Geneva Convention of 1925) that chemical warfare should be prohibited. Germany and the USSR voted against even this watered down agreement. Between that time and 14 October 1933 when Germany withdrew from the conference and from the League of Nations, Adolf Hitler came to power in January 1933 (before the British Draft Convention of March failed to pass), and Germany withdrew from the conference and from the League of Nations on 14 October 1933. Statesmen belatedly and unsuccessfully tried to devise arrangements to provide German equality, balance the European power rivalry,

and satisfy all by permitting Germany to rearm up to some level, down to which the others would disarm. A last futile meeting took place in May 1934, but the Conference then collapsed without ever being formally concluded. The total failure of the Conference was followed by the League's failure to enforce international sanctions against the Italian invasion of Ethiopia in 1936, and the period from 1934 onward was distinguished by general rearmament culminating in World War II (Refs. 1, 6, 17, 18, 19).

Besides attempting to achieve general arms reductions and to constrain the wartime uses of certain types of armaments, the League also dealt with the subject of arms trade and transfers. The Covenant had specifically assigned to the League "the general supervision of the trade in arms and ammunition." Accordingly, the St. Germain Convention for the Control of the Trade in Arms and Ammunition was drawn up in 1919 by the plenipotentiary powers. This convention was seen as an extension of the Brussels Act of 1890 which had limited the flow of arms into central Africa prior to World War I. Consistent with not joining the League of Nations, the United States did not accede to the St. Germain Convention and it never came into force. In 1925, the Temporary Mixed Commission of the League produced a revised version of the St. Germain document known as the Geneva Convention on Conventional Arms. This proposal foundered on arguments relating to arms trade publicity and inequalities of effects of prohibitions of exports among the affected countries. Strong arguments were also made that controls could better have been placed on production rather than transfers. During the life of the League, eight more variant proposals to control arms transfers were considered. None of these ever came into force. Despite the failure of such attempts, the League did compile and publish annual statistics and other information on international arms transactions (Ref. 9).

#### Reflections on the Interwar Period

Several observations are suggested by the interwar experience:

1. The intensive arms control studies and negotiations of the period occurred in a European/American "great power" world as a search for multinational solutions. Since the "third-world" had not yet emerged, problems of arms competition and constraint measures among smaller, newly independent and client states were illuminated only in general by the 1919-1939 record.

2. Primary emphasis during the period was directed to qualitative aspects of armaments and controls, but the primary realities were security and national ambition in an imposed, old order. The victors of World War I would not act together to perpetuate or enforce this

order, and it could not otherwise resist the pressures for change. The seeming dilemma of precedence in reduction of tensions versus arms control was dealt with by concentration on the classification of arms types and levels as the touchstones of security and peace, neglecting the possible supplementary (and not necessarily alternative) roles of political and economic measures.

3. Technical attempts to calculate weapons and force equivalences showed that multiple factors of extreme complexity were involved, even with the weapons and forces of the 1920's. Unqualified solutions in scientific terms that enjoyed general acceptance simply could not be established.

4. The adoption of the offensive/defensive distinction, although highly attractive in general terms, became more confusing than useful. Although probably not so rigidly viewed by its main proponents, it tended to require mutually exclusive categories that defied firm definition by scientific (technical) demonstration or political agreement. In the end, use of the distinction seemed to be reduced to saying, "Let us agree on faith that security can be attained by eliminating offensive weapons, that offensive weapons can be clearly defined, and that these are what they are." Reliance by the statesmen in power on a concept of offense defined by weapons ignored the voices of some military spokesmen who insisted that offense could be defined only in the context of military operations.

#### POST-WORLD WAR II EXPERIENCE

##### Negotiation Within the United Nations, 1946-1960

Against the background of failure of the League of Nations, the United Nations Organization was developed on the principle of maintaining peace through collective security. This approach was regarded as more realistic and more likely to preserve the peace than the League's concentration on general disarmament and only procedural settlements of disputes. As after World War I, the losers were at once required to disarm. The UN Security Council was seen by some as "the five policemen," but this view presupposed a continuation of the wartime collaboration between the allies that in fact foundered in the post-war bipolar confrontation of the superpowers and their allies. In this confrontation, the West soon found it desirable to incorporate German manpower, industrial resources, military skills, and geography into the NATO alliance opposing the Soviet hegemony in Eastern Europe. To a lesser degree, Japan was brought into the new Western military arrangements through its geography and logistic characteristics and by a limited reactivation of "Self-Defense Forces."

The wartime development of atomic weapons by the United States was regarded as the most important technological breakthrough and qualitative distinction in weapons history. All other arms -- with a grey area sometimes allowed to chemical and bacteriological weapons -- became "conventional," nuclear weapons and their delivery means became strategic (decisive). The United Nations Atomic Energy Commission was set up in January 1946 to plan for the control of atomic weapons, but also encompassed control of "all other major weapons adaptable to mass destruction." In December 1946 the General Assembly unanimously resolved in favor of "an early general regulation of armaments." The UN Commission for Conventional Armaments was then formed by the Security Council in February 1947, but went into an early and continuing deadlock (Refs. 20, 21).

At the end of World War II, the United States and its European allies demobilized their vast conventional forces at a precipitous rate in response to public and economic pressures and on the presumptive utility of atomic weapons. The Soviet Union, whose conventional forces -- particularly its army -- were larger than those of the Western allies, did not correspondingly demobilize. As the Cold War tensions developed, then, the United States briefly held an atomic monopoly, while the Soviet Union held an overwhelming preponderance of conventional forces and arms. Nevertheless, the emphasis in arms control became and, in general, remained focused on control of atomic weapons as the primary issue. The Soviet Union at this stage demanded that atomic weapons be banned, but rejected the international system of verification and inspection contained in the US Baruch proposals first advanced in June 1946. By late 1949, the Soviet Union had again rejected international controls and proposals for an arms census and had detonated its first atomic weapon. In January 1950 the USSR withdrew from the Atomic Energy Commission (Ref. 20).

During the period of the United States atomic monopoly and for several years after 1949, it was sometimes stated that if Moscow and Leningrad were hostages for the good behavior of the Red Army, Western Europe was also hostage for the good behavior of the US Strategic Air Command. After the USSR gained its atomic capability, the conventional arms posture of the United States and the West was improved as a result of the establishment of NATO and the Korean War. When the United States thermonuclear detonation in 1952 was quickly counterbalanced by the USSR in the following year, both sides accelerated their research for and production of intercontinental and intermediate range missiles, long range bombers, and smaller, tactical nuclear weapons. In general, the hoped-for political assurance of world security through the UN and its instrumentalities for control of arms was replaced by what Winston Churchill called the "balance of terror" in military capabilities.

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Between the first meeting of the UN General Assembly in 1946 and mid-1958, arms control negotiations were actively, if sporadically and inconclusively pursued in a number of sequential phases. Bernhard G. Bechhoefer's comment on these years was to be applicable to later years as well:

In all these periods, certain ideas and proposals appear regularly like leitmotifs throughout the negotiations. Yet there is a progression that differentiates seemingly identical proposals when viewed in relation to changing circumstances (Ref. 20, pp. 9-10).

In 1950 President Truman had proposed that the UN Atomic Energy and Conventional Disarmament Commissions be merged, and a new Disarmament Commission was formed in January 1952. This forum developed — but without general adoption — a number of proposals for nuclear control and also for control of conventional arms. After the Korean War ended, President Eisenhower, in December 1953, declared that "elementary prudence" was now the true reason for arms control and urged that, in the old precedence dilemma of reduction of tension versus arms limitation, neither had necessary precedence: they were reciprocal and could proceed simultaneously. Soon afterwards, however, in January 1954, US Secretary of State John Foster Dulles announced the doctrine of "massive retaliation" as the principal US deterrent to acts of international aggression. Later in the UN Disarmament Commission, the USSR in September 1954 accepted in principle the commission's proposal for limitation of both nuclear and conventional arms, defining this acceptance in May 1955 in a series of new proposals. The Geneva Summit Conference of July 1955 followed, with President Eisenhower's proposal for "open skies" aerial reconnaissance. On 6 September 1955 the US reserved (suspended) all its pre-Geneva positions. Negotiations became deadlocked by 1957, as both sides found that declarations of principle were easier than agreement and, to varying degrees, could substitute in world opinion for agreement (Refs. 6, 20).

Substantial — although unsuccessful — attention was initially given to conventional arms limitation in the period from May 1955 to September 1957. The USSR, countering an Anglo-French proposal of 1954, advanced a detailed plan for conventional disarmament only. This and the counterproposals of the next eighteen months included stages and specified reductions of manpower, certain features of inspection, and exchanges of information on military expenditures. As the proposals and counterproposals evolved, however, the weapons included were strategic nuclear-armed missiles. Conventional weapons did not enter into the later versions, either qualitatively or quantitatively, except as they would have been limited in deployment by the reduction of conven-

tional manpower and units. Some areas of partial agreement were reached in the discussions of 1955-57, but the whole matter failed. In part, at least, this failure occurred because the proposals became so comprehensive — manpower, nuclear weapons, missiles, budgets, information exchanges, and inspection means — as to involve a multitude of details so great as to impede the major considerations. In November 1957, the Soviet Union withdrew from the negotiations in the Disarmament Commission and its subcommittee (Refs. 6, 20).

#### Arms Limitation and Conventional Proliferation After 1960

Despite these experiences, in an echo of the League of Nations and its aspirations for universal peace through disarmament, the UN General Assembly in November 1959, unanimously endorsed a resolution calling for "complete and universal disarmament." The early 1960's saw a revival of serious attention to this subject, as shown, for example, in the literature of arms control and disarmament by the surge of new books, analyses, and symposia during these years. In the UN, the Eighteen Nation Disarmament Committee (ENDC) was formed in 1961 -- this body, with enlarged membership, was redesignated in 1969 as the Conference of the Committee on Disarmament (CCD). Stimulated by President Kennedy's "peace race" speech at the UN in September 1961, the UN convened a conference of the ENDC at Geneva in March 1962. At this assembly, both the US and USSR put forward GCD plans, but without adoption. The mounting escalation of nuclear testing, however, led to the first major post-war arms control agreement in the Limited Test Ban Treaty signed at Moscow on 5 August 1963 by the US, UK, and USSR and subsequently adhered to by about 120 additional states (Refs. 7, 20, 21).

The General Assembly in 1969 reaffirmed the resolution on complete disarmament, but by then the subject had become more of an ideal than a goal actively sought. Conventional arms constraints as such did not again receive international attention comparable to the 1955 level until the initiation of the NATO/Warsaw Pact's Mutual and Balanced Force Reduction (MBFR) talks in Vienna in October 1973. These talks, first formally proposed by NATO at its Ministers Meeting in Reykjavik in June 1968 but aborted then by the Soviet invasion of Czechoslovakia in August of that year, responded to long-standing economic and political pressures to reduce the concentration of forces in the two halves of Germany and to earlier proposals by the Pact for "mutual disengagement." Fundamental dilemmas of quantitative and qualitative arms control have been revealed in these talks. NATO's position has been to move to more apparent quantitative balance by reducing to equal alliance ceilings on total forces in the guidelines area of East Germany, Poland, and Czechoslovakia on the Pact side and West Germany and the Benelux states on the NATO side. The Pact, on the other hand, has sought to maintain the present imbalance by proposing equal percentage reductions on all forces — stationed and indigenous — within the area (Ref. 22). NATO has also sought ways to overcome the impasse in these conflicting positions by offering to

withdraw 1000 tactical nuclear weapons and some delivery means in exchange for the proportionally larger reduction of Soviet forces from East Germany that would be required to approximate quantitative balance — namely, removal of an entire tank army and its associated equipment.

The series of fifteen ratified treaties and conventions, including the Antarctic Treaty of 1959, the Limited Test Ban Treaty of 1963, the Non-Proliferation Treaty of 1968, and the SALT I-ABM Treaty of 1972, showed that limited agreements could be reached in a climate of mutual interests seeking balance and stability to preclude specific dangers. These treaties, mostly bilateral or multilateral undertakings outside the UN, were mainly concerned with nuclear limitation (Refs. 7, 21, 22).

Since World War II, the principal instances of conventional weapons limitations, including qualitative aspects, have come about as part of ceasefire agreements ending several of the conventional, or limited, wars that occurred despite the nuclear "balance of terror." In the Korean Armistice Agreement of July 1953, the parties undertook not to introduce any weapons into Korea except on a one-for-one replacement basis of the same type and effectiveness. North Korean violations, however, soon vitiated this agreement. The agreement at Paris on 27 January 1973 for ending the war in Vietnam included provisions for the cessation of sea and land mining and removal of sea mines from Vietnamese waters. The Sinai Stage II disengagement agreement of 1 September 1975 contained specific qualitative and quantitative limitations on Egyptian and Israeli forces in their respective limited force zones: no more than eight standard infantry battalions, 75 tanks, and 60 artillery pieces not exceeding 12 km in range capability. Weapons were also limited by restricted deployment areas, to include antiaircraft missiles; and inspection by UN forces was accepted.

Besides these specific negotiations and agreements to limit deployments of weapons and forces, the post World War II era continued the second concern of the late nineteenth century with weapons use and effects in the conduct of war. Building on the work of earlier meetings in the mid 1950's, international conferences met at Geneva in 1971 and 1972 under auspices of the International Committee of the Red Cross (ICRC) to consider "reaffirmation and development of international law applicable in armed conflicts." As a result, the Swiss government convened early in 1974 a continuing Diplomatic Conference for the codification and improvement of the international law of war. To support the Diplomatic Conference, the ICRC had convened at Geneva in 1973 a conference of government and private agency experts to study "conventional weapons that may cause unnecessary suffering or have indiscriminate effects." Further conferences with expanded membership followed in 1974 at Lucerne and in early 1976 at Lugano. The ICRC reports of these conferences on weapons are considered to be part of a series for the UN. Such reports and any agreed positions and recommendations taken by the

Conferences of Government Experts are intended to assist the Diplomatic Conference in devising new protocols or declarations open to subscription by all nations along the lines of the Hague Conventions or the Geneva Protocol of 1925 (Ref. 23).

A related, but separate, development was the signing on 10 April 1972 at Washington, London, and Moscow of the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological and Toxin Weapons and Their Destruction. This convention supplemented the 1925 Geneva protocol prohibiting the use in war of asphyxiating, poisonous or other gases and of bacteriological methods of warfare. Outside the Non-Proliferation Treaty it is the only instance of an agreed constraint on development, production and stockpiling — in this case arising out of an earlier prohibition on use in war. The forum for agreement on the 1972 Convention was the Conference of the Committee on Disarmament (earlier, the Eighteen Nation Disarmament Committee) at Geneva.

Because nuclear, chemical, and biological weapons have been treated in forums such as the CCD and related UN bodies and studies, they have generally been excluded from discussions in the ICRC conferences. The ICRC experts on weapons and effects have concentrated rather on incendiaries of all kinds, conventional and fragmenting munitions, time-delay and "treacherous" (booby-trap) weapons, small caliber projectiles (especially of high velocity), and new technology trends including lasers, fuel-air explosives, and other developments (Ref. 23).

The ICRC conferences and reports appear to be motivated by philosophical concepts like those of the first period of modern arms limitation attempts and — by frequent references to the St. Petersburg Declaration of 1868 and the Hague Conventions of 1899 and 1907 — underscore the continuing importance of those historic conferences as sources of precedence and guidance. Assuming that war is at least possible if not inevitable, they attempt to keep it within bounds by constraints on weapons uses and effects by humanitarian considerations carefully formalized in law. In keeping with the guiding principles of the 1868, 1899, and 1907 international conferences, they hold that the only legitimate objective in war is to weaken the opponent's military forces and that weapons effects and uses that exceed this objective by causing "unnecessary suffering or have indiscriminate effects" are contrary to the laws of humanity. Some modern qualitative weapons improvements (e.g., greater accuracies in target identification and designation and in delivery of fire) may make the problem of identifying "indiscriminate effects" less difficult than the perennial problem of identifying "unnecessary suffering;" however, both problems remain subjects of concern for qualitative constraints on conventional armaments.

While the post-war dangers of superpower confrontation and the problems of strategic nuclear weapons engaged primary arms control attention after World War II, new, independent nations emerged in scores from the break-up of the older colonial empires. Some of them aligned themselves with one side or the other in the Cold War; some tried to maintain "positive neutrality" or non-alignment. In a number of cases, bilateral or regional antagonisms, not directly related to the Cold War, nevertheless imperiled the general peace. Among the more intractable antagonisms were the confrontations of Arabs and Israelis, North and South Korea, North and South Vietnam, India and Pakistan over Kashmir, and Greece and Turkey over Cyprus. Lesser tensions continued between the Arab states and among the new African states. Newly gained independence meant new nationalisms, sometimes developing into drives for regional power roles, as illustrated by Iran and India. Insurgency conflicts, called "wars of national liberation" by Nikita Khrushchev, sprang up in Asia, Africa, and Latin America.

The diverse new states and insurgency movements had at least one common denominator — they all wanted weapons, and, in general, got them, giving rise in a new form to a third concern of the late nineteenth century, namely, arms transfers. By the late 1950's, both the Arab-Israeli conflict and the inter-Arab conflicts of "conservative" and "radical" nationalisms had become polarized in the general Cold War context. Here and elsewhere, both the US and USSR and their principal allies armed their lesser allies and granted or sold weapons to numerous small states to induce their alliance or alignment. Further transfers, in this environment, became common; and the international commercial arms traffic prospered. Both within and outside the UN numerous proposals were made for negotiated embargoes, registration, publicity, or other controls on the international arms trade: for example, by the USSR in 1956-1958, by Malta in 1965, by Denmark in 1968, and by the US in 1964-1968. In the late 1960's and the early 1970's both houses of the US Congress took increasing interest in arms trade and sponsored several studies, especially of the arms traffic in the Middle East. None of these efforts succeeded in reversing a trend stimulated both by demands in the Third World and competition among suppliers. In some instances, Third World recipients also developed indigenous weapons research and production capabilities. Finally, arms acquired by the new states (notably Israel, Egypt and other Middle East states) became increasingly sophisticated, including high performance fighter aircraft, air defense systems, deployed electronic technology, armored vehicles and missiles. By mid-1975, this region in particular was distinguished for accelerated arms procurement stimulated by nationalism and national interests, unresolved tensions, oil revenues, commercial arms traffic, and continuing client relationships (Refs. 9, 24-26).

Summary of the Post-War Years

In sum, in the post-World War II period principal attention has focused on nuclear rather than nonnuclear or conventional weapons and forces. The record of the period in terms of actual agreements reached is far better than that of the post-World War I era — perhaps principally because of the greater dangers involved and because comprehensive utopian solutions were gradually eschewed in favor of multiple limited agreements that were attainable (Refs. 7, 27-30).

Proposals and negotiations for limiting conventional armaments have largely been unsuccessful and, except for the proposals of 1955 and the MBFR talks, have received only secondary time and attention which has been mainly in quantitative terms. Qualitative constraints have received primary attention only in the ICRC conferences. The general controls — both qualitative and quantitative — imposed on the defeated nations of World War II could also be imposed by suppliers on client states, and in some cases were. When these constraints were severe, however, countering political pressures developed. Temporary withholding of arms shipments by the United States from Greece in the late 1960's and from Turkey in the mid-1970's, and the controversy over constraints placed on the deployment configuration of Hawk missiles purchased by Jordan caused severe strains in US relations with these countries. Similarly, from 1972 onward, Soviet withholding of certain aircraft and missile types desired by Egypt, and the slowdown in delivery of other agreed shipments altered relations. These imposed constraints were a major factor in President Sadat's dismissal of Soviet advisers in July 1972, in his later dramatic shift to resume political relations with and reliance on the United States, and in his decision to diversify arms supply by purchase in Europe or, if possible, from the United States (Refs. 22, 26).

By 1975, substantial qualitative improvements in nonnuclear arms effectiveness were on hand or imminent, such as precision guided munitions, cannon-launched guided projectiles, remotely piloted vehicles, super incendiaries, and new antitank munitions using the high density of depleted uranium. As the technical effectiveness and power of non-nuclear arms increased, the potential damage difference between non-nuclear and nuclear operations decreased, at least in the tactical sense. Distinctions between tactical and strategic weapons also became blurred by the cruise missiles under development by both the US and USSR — reportedly capable of previously unknown accuracy at either intercontinental or battle area ranges with either nuclear or nonnuclear munitions. Strategic strikes or counterstrikes, some thought, might thus become possible without crossing the nuclear threshold. As Richard Burt of the International Institute for Strategic Studies wrote, "Deterrence of strategic attack rested on mutual fear of using

nuclear weapons. But with the advent of strategic conventional weaponry, this simple equation is undermined" (Ref. 32, cf Refs. 22, 26, 31).

#### GUIDANCE FROM THE PAST

This survey of arms control efforts from about 1850 to the present time suggests a number of generalizations that may serve as guidance for considering qualitative constraints on conventional armaments.

1. Limitations on conventional arms must be evaluated in light of actual or potential conflict situations. Concentration on priority of reduction of political tensions as a precondition for arms limitation, or the reverse, is simplistic; both should be approached simultaneously.
2. Except in a few instances when states have been willing to accept military inferiority for temporary or "higher" purposes, constraints can best be attained in situations of relative military balance and perceptions of mutual dangers to security or national self-interest. Arms control to be enduring depends on political agreement rather than imposition or unilateral adoption.
3. Historically, qualitative constraints have sometimes been linked directly with quantitative constraints and sometimes not. Whether or not both are explicitly stated in an agreement, however, a qualitative constraint always implies a quantitative constraint.
4. In general, weapons cannot be successfully classified as offensive or defensive for arms control purposes apart from consideration of the type and level of operations in which they may be employed.
5. Technical calculations of relative weapon effectiveness ("equivalencies") are vulnerable to protracted argument and political obfuscation, and by themselves cannot serve as the determinant of limitation agreements.

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## Chapter 3

THE IMPORTANCE OF QUALITATIVE IMPROVEMENTS  
IN CONVENTIONAL ARMAMENTS

## GENERAL

The review of past attempts to negotiate arms control agreements, including qualitative constraints, has revealed something of the importance nations attach to qualitative improvements in their armaments. Although some weapons characteristics, i.e., qualities, have been singled out for particular constraint, the dominant evidence is that nations prefer competition in improving the qualities of their weapons to constraining them by formal agreement. This is particularly true in the "conventional" area; indeed, the characteristics that nations have most urgently sought to constrain were characteristics that qualified those weapons as "nonconventional" — e.g., the mass destructiveness of nuclear weapons and the indiscriminateness and potential uncontrollability of chemical and bacteriological weapons. Efforts to control such things as the offensive as opposed to defensive characteristics of conventional weapons — whether of artillery or battleships or bomber aircraft — have been far less successful or enduring. Even efforts to constrain "inhuman" qualities, such as the "sneak attack" potential of submarines and the physiological impact of dum-dum bullets, have been without notable success.

Both the desirability and the feasibility of agreeing on future qualitative constraints on conventional armaments depend greatly on the importance that attaches to qualitative improvements in current inventories. It is frequently alleged that arms competition in the technological era is, in fact, now a qualitative competition more than a quantitative competition, particularly among the industrial states such as the US and USSR and their NATO and Warsaw Pact allies. In such cases, competition takes the form of competition in research and development of new systems. In less industrial regions where political tensions run high, such as the Middle East, competition for qualitative improvement of inventories would take place by acquisitions from more industrial states. With increased availability in world markets of advanced weapon systems, competitions in other more quiescent regions, such as Latin America, may be qualitative as well as quantitative as states in those regions give increased importance to improving the capabilities and not merely the sizes of their forces.

This chapter examines some of the evidence that qualitative improvement in conventional armaments is a priority concern of modern states that may impede or give urgency to attempts to agree on qualitative constraints. Much of this evidence is subject to a high order of subjective interpretation and controversial in its import. Evidence is

sought in three broad areas: (1) the motivations for seeking qualitative improvements in conventional weapons that can be adduced and the factors influencing such motivations; (2) the costs and resources that nations are willing to commit to qualitative improvements in their armaments and inventories; and (3) some salient aspects of arms competitions that have taken place in significantly different regions of the world, namely, in the NATO-Warsaw Pact area, in the Middle East, in Latin America, and in the Indian Ocean.

#### MOTIVATIONS FOR QUALITATIVE IMPROVEMENTS

Motivation to improve the qualities of particular armaments or of entire inventories of armaments are complex, generally involving a mix of technological, military, economic, and political factors. Given this complexity and the fact that such factors may converge in some instances and diverge in others, it is somewhat dubious to ascribe general or typical motivations to nations for seeking qualitative improvements in their armaments and inventories. Motivations for qualitative improvements are likely to be highly specific to the armaments in question and to the nature of the competition among particular groups of states. Nonetheless, some generalizations can be hazarded and some categories of motivation identified and assessed. General types of motivations are discussed below under the four principal categories of factors that appear to affect motivations.

##### Technological Factors

Especially among states such as the US and USSR with sophisticated and vast technological-industrial bases, something like a "technological imperative" to improve products appears to be at work. No technologically perfect weapon system was ever designed and fielded. Almost as soon as a complex system such as a new tank or combat aircraft appears, efforts continue to improve its lethality (e.g., firepower, accuracy, rate of fire), its mission flexibility (e.g., propulsion, maneuver, target acquisition), and its sustainability (e.g., effective counter-measures, protection, maintainability). Efforts at such evolutionary product improvement are frequently low-cost in comparison to the improvements in effectiveness that are expected. They continue until a point is reached where the marginal utility of improving an existing general design is judged to be equal to or less than the additional cost of achieving the incremental effectiveness.

Since weapons systems wear out in peacetime and require replacement or become obsolete by advances in other weapons systems, new designs or "generations" of such weapons systems appear with a frequency of about once in every ten to fifteen years. Often the new generation embodies a subsystem that is revolutionary in comparison to the corresponding subsystem of the previous generation and may produce a quantum increase

in overall system performance or effectiveness. All-weather and night-vision capabilities, guidance for munitions, and electronic counter-measures are examples of revolutionary advances in subsystems that effect quantum improvements in overall system effectiveness.

In such examples, the momentum, if not the motivation, to improve armaments is there because a technological dynamic exists. Of course, resources have to be committed to sustain the technological dynamic, and product improvement can be a costly process. However, part of the technological dynamic may be to produce greater efficiencies in uses of resources as well as greater effectiveness. Old weapons systems — like old automobiles — are frequently replaced with improved models because the improved models are expected to be cheaper in the long run with better relative life-cycle costs. Moreover, improved weapon systems are often expected to effect overall economies (or, at least, humaneness) in force development by substituting technology for manpower in exposed combat elements of the force.

A poorly-managed technological momentum can, of course, produce new weapons systems that are merely more costly or more complicated and glamorous than the systems they replace. Not everything that is technologically feasible is desirable, even from narrow military or economic standpoints. This aspect or potentiality of technological momentum leads to the speculation whether qualitative constraints on conventional armaments may, in some instances, converge with military and economic interests.

#### Military Factors

The fact that such technological momentum exists requires that each of the superpowers maintains and improves the quality of its conventional armaments lest its adversary develop and acquire weapons that are significantly better than its own. Not every innovation or development is matched on a direct basis; both the US and the USSR have their distinctive priorities based on their perceptions of the other's emphases and advantages, the state of their own technology, their military doctrine and tactics, and the balance and size of their own forces. However, they do compete in most areas of military technology at least to ensure that they will not be surprised by the other's technological-military capability. Neither side wants to field forces that would be at a significant or uncompensated qualitative disadvantage. To this extent there is a qualitative competition if not an arms race between the US and the USSR and among their respective NATO and Warsaw Pact allies.

Motivations for qualitative improvements in conventional armaments perhaps run stronger on the NATO side both because a technological lead exists in most areas and because of a desire to compensate for Warsaw Pact numerical advantages in key areas such as tanks, artillery, and

air defense aircraft. Achieving qualitative performance characteristics that promise a higher exchange rate of enemy weapons killed to friendly losses is a high incentive for improvement for the NATO countries. Conversely, the Pact countries seek to preserve quantitative advantages or imbalances by protecting them from qualitative erosion from the NATO side. Quantitative superiority is not a ground for indifference to qualitative challenge anymore than qualitative superiority or lead-time can fully compensate for the adversary's numerical advantages. However, quantitative superiority may allow a somewhat more leisurely qualitative development of armaments and — for reasons associated with costs and resource constraints — require a slower introduction of new models and innovations.

Few conceivable qualitative improvements appear to offer a decisive military advantage to the side that develops them first. Breakthroughs such as the development of gunpowder, the airplane, and nuclear munitions appear in history with relative infrequency and today would require long lead-times to achieve the quantity production and deployment that would be necessary to take full advantage of them. However, some developments can appear to be quite destabilizing to an existing balance, requiring the other side to seek similar or offsetting — and sometimes very costly — improvements to maintain or restore the balance.

The development and deployment by the US and NATO allies of precision guided munitions (PGM) is a qualitative improvement that would appear to require the development of offsetting countermeasures or similar munitions by the Pact side to maintain the "balance" (or imbalance) that they seek. Because technological leads can, thus, be perishable is not sufficient ground for forswearing them. There is always the possibility that the other side may develop technological leads, and qualitative advantages added to quantitative advantages can be most destabilizing indeed. Moreover, in this illustration in particular, there may be additional considerations that favor the introduction of the improvement by both sides. If PGMs enable the destruction of a military target with, say, one-tenth the delivery of ordnance that would be required in their absence, collateral civilian damage associated with particular military target destruction could be significantly reduced on both sides — thereby, potentially reducing the destructiveness of war.

Sometimes the development and introduction of a major qualitative improvement in weapons effectiveness can threaten — in the long run — to be as destabilizing or costly to the side that develops it as to the adversary. For years, the NATO countries have been seeking more effective antitank weapons and have emphasized accuracy and guidance to achieve a greater tank-killing potential as in antitank guided missiles (ATGM). Achieving a better tank-to-tank exchange ratio would be another way of redressing the Pact's numerical advantage in tanks. Advanced armor for a new generation of tanks would appear to be very promising in this regard. However, if the Pact should follow a NATO lead and also

introduce such armor for a succeeding generation of tanks, it could make much of NATO's recent focus on ATGMs obsolete since most of these do not have the high-velocity potential that is required to defeat the new armor. Ironically, it might be easier or less costly for the Pact to add the guidance and necessary weight to their older generation of high-velocity munitions. Again, this potential dynamic of technological improvement is not a sufficient ground for unilaterally forswearing development and acquisition. In this case, however, it may offer grounds for an agreed qualitative constraint, without which — in the long term — both sides might have made large investments that tend to cancel each other out. Not even the side benefits of promising to reduce collateral damage or the likely destructiveness of war would appear to be present in this case.

Competition for qualitative improvements in armaments among less industrialized states or in less industrialized regions than represented by NATO and the Warsaw Pact generally does not involve competition in weapons research and development. Qualitative competition in the Middle East, for example, is competition for purchase of present generations of weapons from the most advanced arms-producing states. For obvious military reasons, both Israel and the Arab states sought to replace their war-depleted inventories with the highest performance modern weapons they could afford and arms producers could supply after the wars of 1967 and 1973. Israel's incentives for qualitative improvement were especially high to redress the quantitative imbalance that favored the Arab states; the Arab states' incentives for qualitative improvement were equally high to enable them to capitalize on their quantitative superiority.

Every state, whatever its size, is concerned with real and potential threats to its existence. Perceived military threats must be offset by countervailing force if a nation state is to endure in independence. Thus, whenever a state assesses its military capabilities as substantially inferior to those of a threatening power, the threatened state normally seeks to redress the balance in some way or combination of ways, usually involving attempts to improve upon the quality (as well as the quantity) of arms at its disposal. Other equally important ways, of course, include diplomacy and military alliance.

States with advanced economies and military-industrial bases look inward to develop the required capabilities. Less-developed states look outward for military assistance and for military and political allies. NATO was formed as a means of redressing a perceived military imbalance between the war-weakened democracies of Western Europe and the threatening monolith of the Russian-dominated bloc of communist states. The act of redressing what one party or group views as an existing imbalance in military strength, however, is often viewed as a provocation by the state or group against whom directed and may stimulate an effort by the latter to restore the status quo ante. If so, an "arms race" can ensue.

History is replete with examples of attempts by individual states to gain military advantages over neighbors or competitors. In modern times, the naval shipbuilding program of Imperial Germany and the rearmament program of Hitlerian Germany, as well as the Japanese armaments program of the 1930's, spring instantly to mind. Since World War II, there are the examples of Korea, Vietnam, Israel and its Arab neighbors, and of course the US versus the USSR.

The desire to gain, retain, or even increase a military advantage can be rooted in many complex and interrelated motives. Ethnic and religious animosities, territorial disputes, access to or control over world markets and commodities, and fundamental political differences are only a few.

#### Economic Factors

Military power is highly expensive even when kept in a standby or reserve mode. It appears, on an annual basis, to be relatively more expensive to maintain in free, democratic societies than in closed societies because of the way governments in the former must account to their electorates for the levying of taxes and the expenditure of revenues. Free societies normally prefer to spend the greater part of available monies in ways that directly "promote the general welfare." For this reason they consciously seek ways to economize on the maintenance of essential military capabilities. Closed societies of the Soviet-type are, however, also not without internal pressures to economize on military outlays as a means of making additional funds available for non-military purposes. In short, there are sound economic reasons why democracies and dictatorships alike can be motivated to pursue armament development programs whose goals are an equal or greater amount of military power for a reduced level of spending. Technological, military, and economic factors, thus, can converge to make qualitative improvements in armaments attractive.

Despite the costs of maintaining aging or obsolescing armaments, relative economies in new, qualitatively improved weapons are difficult to achieve without volume production because of relatively high RDT&E and other investment costs. Hence, industrialized states (particularly the smaller ones) frequently seek foreign sales to assist them in reducing unit costs of armaments. With several arms suppliers operating in international markets, a competitive incentive is added to others to produce and offer better models.

Arms sales offer other economic benefits as well. A nation or group of nations, say, for example, the UK, Italy, and West Germany, that may be able to purchase a needed aircraft such as the F-16 at an attractive unit cost from a supplier such as the US, may still prefer to develop for themselves and offer to other countries a competitive model — e.g., the multi-role combat aircraft (MRCA) — in order to support an indigenous arms industry. Again, technological and military

factors combine with economic factors in the overall motivation to compete in the development and production of qualitatively improved aircraft. The states involved naturally prefer to maintain and encourage indigenous science and technology characteristic of an industrialized nation. They also, for security reasons, wish to have a domestic source of needed supply, if they can afford this, to satisfy military requirements rather than perpetuate or increase dependencies even on close allies. International arms sales can spell the difference between closing an arms-producing plant or keeping it in operation. Defense managers in industrialized countries prefer not to close an arms-producing facility that might be needed in time of war (when outside supply might be severely restricted or cutoff), because the lead time required to reactivate it should war occur may be too long.

Foreign sales of advanced weapons are also desired in some cases as a means of offsetting an unfavorable national balance in international payments. They can and do serve other purposes as well. Especially for the superpowers desirous of gaining or maintaining friendly allies, sales (or grants) to non-industrialized countries create dependencies on the supplier for spare parts and resupply of items as they become needed. The supplier, by extending or withholding the additional material, may exert a measure of influence or control over the recipient's behavior. US military assistance to developing countries is often justified on these grounds. When recipient states are poor and there is little competition among arms suppliers, obsolescing models of modern armaments could make up the bulk of arms sales and grants. However, with more suppliers and new oil wealth in areas such as the Middle East, competition in international sales is an added spur to qualitative improvement in armaments and has led to rapid improvement in inventories of some developing countries.

#### Political Factors

International political factors that contribute to motivations to improve conventional armaments or inventories are closely related to some of the military and economic factors discussed above. Among the industrialized states, the principal political factors that operate appear to be those associated with maintaining national security, denying to militarily strong adversaries political leverage that may derive from their military capabilities, and in some cases projection of power and influence into new regions. Recent Soviet developments in naval armaments (e.g., surface-to-surface shipboard missiles) and in their entire naval inventory (e.g., new carriers, etc.) appear to be strongly motivated by a desire to project power in the Mediterranean and the Indian Ocean in particular.

Despite the maxims of Clausewitz and Mao, the correlation between military and political factors can be exaggerated with respect to motivations to improve conventional armaments. Except for the case of

Soviet naval armaments, it is difficult to find recent instances in which qualitative developments in conventional armaments have contributed to political power and influence in a direct way among major powers. Political power and influence among major powers have had a more direct relation to nuclear weapons and quantities of conventional armaments. Alliance systems and other forms of political-military-economic dependencies have also had a significant role in power and influence. To some extent, as noted in the preceding paragraphs, these have become the nexus in which new political motivation to improve conventional armaments can be found as competition in arms supply has become important in areas such as the Middle East.

Political factors play a more significant role in the less developed areas of the world where military balances are less stable and less directly affected by the nuclear balance between the superpowers. Qualitative improvements in conventional armaments have symbolic as well as real military value in such regions. The symbolic as compared to the real military value may be especially important in areas such as Latin America where relatively few direct military threats are perceived, but competition for political and economic power and influence does exist.

#### Other Factors

Closely related to the symbolic — or predominantly political — value that sometimes attaches to having more modern armaments than one's neighbors and political rivals is a putative prestige value. It is especially difficult to determine the extent to which this factor operates in motivations to develop or acquire the latest armaments. Few statesmen would emphasize the prestige value in justifying weapons acquisition, although French spokesmen have cited the importance of being a full nuclear power in explaining why the French developed the Pluton tactical nuclear missile. Undoubtedly this factor does operate, especially among aspiring powers, but it generally operates in consonance with other military, economic, and political factors.

Analysts of political and governmental decision-making processes have ascribed other types of motives to participants in these processes. Indeed, analysts such as Graham T. Allison and Frederic A. Morris (Ref. 1) and Morton Halperin (Ref. 2) have suggested that the real "determinants" of military weapons may lie in organizational and service interests and other domestic factors and competitions far more than in factors that lie in the competition among states. Allison and Morris, in particular, see significant implications for arms control or constraints in such a hypothesis. Their argument is interesting, but not entirely convincing except in saying that arms control and prudent defense management converge in interest in weapons choices for internal decision-making. So long as nations perceive external military threats, the factors that dominate the extent to which they pursue qualitative

improvements in armaments are likely to remain external military, economic, and political factors. Internal factors of organizational and service interests and rivalries may channel but are not likely to overshadow motivations that derive from factors that are more external.

#### COSTS ASSOCIATED WITH QUALITATIVE IMPROVEMENTS

The monetary costs of seeking qualitative improvements in conventional armaments may be grouped in two broad categories: those associated with the research and development of an improved item; and those associated with its acquisition, operation, and maintenance. At present, only the more industrialized states of Western and Eastern Europe and the US and USSR, with the scientific and technological potential to do so, commit significant portions of military and national budgets to R&D on improvements in conventional armaments. Some less developed states aspiring to great power status — such as the Peoples Republic of China and India — have committed large sums of R&D funds to nuclear development and may signal a pattern for other less developed states who can more readily acquire improved qualitative armaments by purchase from abroad.

Both types of costs — R&D and acquisition and O&M — must be considered for highly industrialized states. Of the two, R&D costs are frequently considered to be *prima facie* evidence of the existence of a qualitative arms race among such states (Ref. 3). In its 1972 yearbook on world armament and disarmament, the Stockholm International Peace Research Institute (SIPRI) averred:

The post-World War II rise in world military expenditure has been accounted for, to a large extent, not by a traditional proliferation of quantities of armaments, but by the technological arms race. This race involves the original replacement of "obsolete" weapons by generations of successively more and more complex, costly and lethal types. Research and development (R&D) efforts form the core of the technological competition: they are the source of the continual "improvements" in weaponry. If all R&D efforts were abruptly stopped, the manufacture of weapons for replacement purposes might still continue; the quantities of existing weapons might be increased; and the arsenals of the smaller and middle powers might even be brought technologically closer to those of the USA and the USSR through international arms transfers. But in its most important form--involving the continual production of new, more dangerous and ever more expensive weapons--the arms race would come to a halt (Ref. 4, pp. 149-150).

However, as noted in the previous section, much R&D is justified, if not motivated, by a desire to achieve overall economies in providing for national military capabilities. Such economies may be sought in improved products that are less expensive to operate and maintain, in achieving a qualitative superiority in some systems that would allow less need for quantity, or by relieving manpower burdens especially in the combat elements. For countries with an arms export capability other economies such as lowered unit costs through volume sales and improvement in the balance of payments may also affect the expected return on the investment that R&D represents. Of course, this investment may be viewed as an investment of risk capital with no guaranteed pay-off of the type sought. When the expected direct payoff does not materialize — as, for example, in the US Main Battle Tank (MBT)-70 — the argument can still be made that learning took place and, at least, by-product technologies did materialize. Hence, despite advances in cost-and-effectiveness analyses and life-cycle systems costing, no relatively unambiguous method exists for determining net cost of improvements in conventional armaments that result from R&D of new systems.

There is, furthermore, no agreed basis for comparing the expenditures of different countries and particularly those of the largest spenders: the US and USSR. The US Under Secretary of the Army for Research and Development recently estimated that Soviet expenditures on R&D exceed those of the US (current level about \$10 billion annually) by well over \$2 billion a year. This difference alone would be sufficient to match US outlays to achieve qualitative improvements in armor (the XM1 Tank and MICV), advanced helicopters (UTTAS and AAH), surface to air missiles (SAM-D), the B-1 bomber, the Trident submarine, and several other programs (Ref. 5). US expenditures on R&D are reported publicly and rather completely, with amounts generally allocable to individual systems. In the total federal budget, funds for military R&D can generally be distinguished from nonmilitary R&D. No such public accounting is made in the Soviet Union (and many other states as well), and most analysts believe much military R&D is hidden in nominally "civilian" programs anyway. Estimates of Soviet military R&D expenditures are, therefore, built up from many interrelated activity indicators. Even these, however do not provide measures of costs that would be comparable to those associated with military R&D in a free-market economy where such activities compete for commitment of resources with alternative activities.

The relative amount of military expenditure that a state devotes to military R&D appears to depend on the level of military spending in general and whether the state is an arms exporting state as well as on the degree of industrialization. SIPRI maintains that the available data show a pattern of positive correlation between the absolute level of military expenditure, on the one hand, and the share of military funds devoted to R&D, on the other:

... in comparison with total military outlays, military R&D funds are even more concentrated-and considerably so-in the hands of the big powers. In percentage terms, this means that while the US, UK, and France each currently devote over 10 percent of their total military to R&D, the comparable proportion for countries with modest and low levels of R&D spending (\$1-150 M), is, on average, only 3.5 percent and in countries with extra low military R&D outlays (below \$1 M annually) only 0.5 percent (Ref. 4, p. 155).

However, in this 1972 study in which SIPRI compiled data on military R&D for 22 industrial states, it abandoned efforts to develop comparable data for the USSR and other Warsaw Pact countries.

The hearings (18 June and 21 July 1975) before a subcommittee of the Joint Economic Committee of the US Congress concerning allocation of resources in the Soviet Union and China reveal basic disagreements within the US intelligence community on how methodologically to determine levels and percentages of spending. For the nation of greatest concern to the United States, Mr. Colby points out that "One could make almost an infinite array of assumptions about Soviet weapons systems and programs beyond the next two years. That is where the problem is" (Ref. 6, p. 51).

Prices of pieces of equipment are equally difficult to determine, not only because of the major differences between free world/communist world economic systems mentioned earlier, but also because of the instability of the international monetary system and rates of exchange. The 1975 edition of the SIPRI Yearbook (Ref. 7) contains a myriad of data concerning the latest systems being developed and produced throughout the world yet most of the data concerning unit costs and R&D costs is very sketchy and applies primarily to US designed systems. Other nations, not only in the Warsaw Pact, but in the rest of the "free" world as well, are far more secretive.

Whether or not to improve current systems or to develop new ones, to promote or restrain exports of these systems, or to increase or decrease military expenditures, involve not only strict monetary costs but also political and military costs, and the kinds of economic costs that may not be measurable in terms of dollars, rubles or francs. A cost of great concern to both industrialized and developing countries is opportunity cost. Resources used in one activity cannot be used at the same time in another. Opportunity costs in national terms involve the social impact of decisions to forego consumer demands in favor of capital investment in heavy industry as in the USSR or the cost to the development of industry of a developing nation or the alleviation of poverty and disease by expenditures on sophisticated, if necessary, weapons. Since there may be important spin-offs in applied technology and development of indigenous industry from military R&D, opportunity costs are both

somewhat easier to foresee and, perhaps, more significant in the acquisition, operation, and maintenance areas than in the R&D area of armaments funding.

Judging how important qualitative improvements in conventional armaments are to less developed states from the monetary and opportunity costs associated with acquisition is, however, as difficult as judging this importance to industrialized states from their R&D expenditures. Costs to arms-importing states are generally reflected in the sales price of the weapon or system, although the nature of the agreement has a direct bearing on the true cost. Direct purchases and credit sales are the most straightforward; however, repayments of credits may be postponed indefinitely. Grant aid or sales below costs have a favorable impact on the recipient, of course, and an unfavorable one on the supplier, especially if the supplier must draw on current inventories to outfit the recipient with qualitatively improved systems. This was the case of the recent American transfer of M60 tanks to Israel. ACDA summarizes economic advantages and disadvantages to recipient countries as:

... factors which may contribute to a favorable effect on economic growth include (1) arms acquisitions on a grant or concessionary basis, (2) imports which do not require large additional expenditures or support services or infrastructure, (3) military training and infrastructure projects which have beneficial spillover effects on the civilian sector, and (4) a recipient government's inclination to increase military spending in the absence of existing arms import programs.

Among the factors which may contribute to an adverse effect on economic development are: (1) the acquisition of arms, particularly large quantities of expensive systems, at full price or with relatively small discounts, (2) an increase in spending on support services and infrastructure, (3) training and infrastructure programs which have little civilian utility, and (4) a recipient government's willingness to increase civilian capital formation in the absence of existing arms import programs (Ref. 8, p. 81)..

In order to determine the overall economic effect, each case must be weighed individually, and a subsequent comparison among nations or regions may or may not be meaningful.

The fact that many developing states have recently turned to purchase of the latest models of combat aircraft, tanks, and missiles is not necessarily a good indication of the price they are willing to pay for qualitative improvement. In many cases, the models they purchase are the only

ones available as arms suppliers compete for influence or for volume sales that will reduce their unit costs. In its study of international arms transfers, ACDA has pointed out that:

Even though economic concerns are gaining in importance, particularly for some supplier governments, these concerns may often play a minor role compared to the political and military motivations of supplier and recipient states. In the case of the US, political and military motivations are the principal elements in arms transfer decisions (Ref. 8, p. 67).

This discussion of costs has not presented a comparison of data revealing expenditures on qualitative improvements around the world. It is highly doubtful whether such data can be developed. The weight that political and military considerations place on decisions for qualitative improvements probably reduce the utility of comparing costs to a much less meaningful level. Projections for the future are especially hazardous. Some costs will undoubtedly rise, especially in the areas of missile and aircraft technology. But the data necessary for making predictions and for making meaningful comparisons between or among regions and countries are not available or reliable.

#### COMPETITION IN QUALITATIVE IMPROVEMENTS

It is sometimes argued that arms competition among industrial states is predominantly qualitative while competition among less developed states is predominantly quantitative. While it is obviously true that industrial states have the wherewithal to compete in R&D, it is not at all obvious that they are less concerned with quantities of weapons or that developing states are more concerned with the quantities of weapons they can purchase than with their quality. A corollary of this simplistic argument is that quantitative changes in developing regions are more destabilizing while qualitative changes in competitions among industrial states are destabilizing. Recent evidence in areas such as the Middle East and, to a lesser extent, Latin America, suggests that the corollary is as dubious as the main argument.

Appendix A presents a discussion of military criteria for classifying qualitative improvements in conventional armaments, in the US-USSR, NATO-Warsaw Pact context. Principal consideration is given to types of qualitative improvements that would affect the quantitative balance and, thereby, perhaps appear to be "destabilizing" — although, from the point of view of the quantitatively inferior side, these same improvements could be seen as "stabilizing." Appendices B, C, and D present discussions of ten-year trends in qualitative and quantitative aspects of arms procurement in the Middle East, Latin America, and the

Indian Ocean region, respectively. Highlights of those discussions are presented in this section following some comments on theories of arms competition.

### Theories of Competition

"Arms competition," on the surface, seems to be a fairly straightforward concept but actually it is vague, covering as it does a wide variety of situations. The question of varying levels of military preparedness among nations has generated little consensus about their functions. One school maintains "that military preparations make for peace by forcing would-be aggressors to count the cost ... [deterrence] reduces the probability of enemy attack by making clear the net loss or the lower net gain that the attack would bring" (Ref. 9, p. 151). An opposing school insists "that, in an arms race, each side strives for military superiority. It is not enough to have parity, for the dangers of underestimating the rival and of his achieving a technological breakthrough still remain. Each side may interpret his rival's capability as a sign of intent. Thus, the arms race becomes circular and self-generating and continues to grow more dangerous..." (Ref. 9, pp. 151-152).

"Competition" and "race" tend to be used interchangeably in much of the literature on arms levels and expenditures. This literature has generated several theories of the origin, frequency, and utility of "arms races" (Ref. 10). They vary from the idea that an arms race is a stabilizing process, consistent with the traditional operations of the "balance of power" model in international relations, to the opposite viewpoint, held by many followers of Lewis Richardson's early research, that it is a destabilizing spiral of escalation leading inexorably to war. Others popularly attribute arms competition to the greed and profit-making of "merchants of death," while the Marxist view holds that arms competition in the Third World has evolved from capitalists' efforts to offset the loss of colonial empires. Still other views include "conflict-by-proxy" between the superpowers, or competition between various caudillos or despots in the region. One significant view holds that arms competition is:

an intrinsic part of the system, deeply rooted in the essential characteristics of modern science and technology, of the decision-making and diplomatic processes of governments, of the global ideological-sociopolitical competition, and of a world structure in which nation-states seem driven by a law of their own nature to seek their security by engaging in some form of power balancing (Ref. 10, pp. 190-1).

There are also varying opinions as to the extent to which competition is related to incipient or potential conflict or is, itself, a form of

conflict. Competition and conflict have some formal similarities. Both conflict and competition require certain preconditions to occur. First, there must be at least two actors or their representatives. Second, there must be some perceived scarcity of some desired "good" (e.g., a new weapon, prestige, hegemony, etc.) Third, there must be a perceived or unperceived incompatibility of objectives. Finally, there must be desired or actual attempts to achieve the objective or "good." The distinction between conflict and competition lies mainly in that, in the former, one of the actors is willing to undermine the effectiveness of a rival's competitive ability by destroying, injuring, neutralizing or otherwise controlling the rival. In competition, the process is indirect, in which the actors interact directly with the "good" sought (or its sources) rather than with each other.

No general theory of competition and conflict appears to cover all situations. On one extreme, theories of the intimate connection between competition and conflict as developed in Kenneth Boulding's elaboration of Richardson's original work — described in terms of initial hostility, reaction coefficients, and rates of change of reaction coefficients with levels of hostility (Ref. 11) — seem almost to fit the Middle East situation. On the other extreme, competition in Latin America — which has been described as an "arms walk" rather than race (Ref. 12, p. 30) — seems better to fit a model of competition for the "good" sought rather than direct competition between states based on incipient conflict. That is, the major powers in Latin America appear to compete with one another indirectly more than directly by interacting with sources (suppliers) of the "goods" they seek. The cases discussed below indicate the variety of types of competition that defy generalization.

#### US-USSR Competition

Qualitative improvements in US conventional capabilities vis a vis the Soviet Union are presently motivated by five interrelated factors: (1) the emergence of relative strategic nuclear parity between the superpowers that gives increased importance to the balance in deployed conventional capabilities; (2) the long-standing emphasis of the Soviet Union on quantitative, if not qualitative, superiority in armored ground forces deployed in and deployable to Central Europe; (3) increased Soviet interest in projection of power to other areas of the world reflected in new naval capabilities and airborne forces; (4) new economic pressures on the US and the West in general resulting from a combination of inflation and recession; and (5) the availability to both sides of improved or new technologies for military application.

Most of these factors are well known and need no elaboration here. What is of more immediate interest is the nature of the qualitative competition they have given rise to. Since the end of World War II, the US has been concerned about the quantitative superiority of the

USSR in tanks and artillery in particular, in addition to active-duty and mobilizable manpower, and has sought to offset these numerical advantages with qualitatively superior armor and artillery. During the fifties and into the early sixties, the US could rely heavily on the strategic nuclear deterrent and tactical nuclear capabilities to counter-balance the quantitative conventional imbalance with the USSR. With Soviet developments in these areas, improved conventional capabilities became important in the mid-sixties and received a new concentration on weapons systems for the European environment following the end of the Vietnam War and the large reductions in manpower.

In his statement to the Congress of 26 February 1975, the Director of Defense Research and Engineering gave emphasis to "technological initiative as a national goal" (Ref. 13, pp. I-6 - I-35). In doing so, Dr. Currie stated that:

The findings of modern science are available to all advanced countries. Almost all of the basic work is published in the open literature and widely circulated. Soviet scientists — who are generally on a par with our own — understand thoroughly the status of science throughout the world. There is no scientific limitation to what the Soviet military establishment can do (Ref. 13, p. I-6).

Although he stated that the US continues to enjoy a technological lead in most military applications, it was clear that actual and potential qualitative improvements in Soviet armaments gave as much urgency to the US technological initiative as did existing Soviet numerical advantages. The high performance in the Middle East War of 1973 of Soviet systems such as the SA-6 air defense missile, the Sukhoi SU-20 supersonic attack aircraft, and the T-62 tank was cited as evidence of alarming qualitative improvements in Soviet armaments in the past decade (Ref. 13, p. II-12).

Dr. Currie characterized the difference in US and Soviet approaches to qualitative improvements that appears to assure a US technological lead. The US approach favors innovation and applications of the most advanced technologies to produce quantum changes in weapons capabilities. The Soviet approach, on the other hand, could be described as "conservative incrementalism" (Ref. 13, p. I-9). The US approach depends on supporting a dynamic technological base that includes exploratory research on literally thousands of technological improvements, concepts, and innovations to produce competitive options for major commitment of developmental resources. The Soviet approach — while not incapable of yielding innovations and quantum changes — more typically develops solidly-engineered and well-proven design improvements.

Qualitative improvements in Soviet armaments that are presently of particular concern to the US tend to build on and reinforce some important

quantitative advantages the Soviets enjoy in ground and air capabilities and to threaten to provide new numerical correlations in naval capabilities.

In the ground warfare area, the Soviet advantage of three or four to one in tanks and about two to one in artillery and mortars may be protected and enhanced by new systems such as the M-1970 tank, which is believed to incorporate improved armor and firepower over the T-62; by the antitank vehicle (BRDM) mounted with the SAGGER antitank missile; and by the new highly maneuverable and durable armored carrier for infantry (BMP), which can also mount SAGGER missiles. US responses (and, in part, stimuli) to such qualitative developments include development and deployment of antitank guided missiles (ATGM), such as the TOW and DRAGON; mounting of attack helicopters with TOW and developmental work on the laser-guided HELLFIRE air-to-ground missile (as well as improvement of MAVERICK); extension of the range and accuracy of artillery through cannon-launched guided projectiles (CLGP); and, especially, concentrated development of a new family of armored vehicles featuring the XM-1 tank with greatly improved armor and firepower and the mechanized infantry combat vehicle (MICV) to replace the M-113 armored personnel carrier.

In the air warfare area, the Soviets have traditionally emphasized an air-to-air capability and air defense and currently enjoy about a two to one numerical advantage in interceptor and fighter aircraft. With recent improvements in ground attack capabilities (e.g., the SU-20 and a new ground attack missile) and in surface-to-air air defense missiles (e.g., SA-6, SA-8, SA-9), Soviet tactical air capabilities pose a serious threat to both US tactical air and ground warfare systems. Improved US field army air defense systems to counter this threat include improved HAWK and eventually the SAM-D medium-to-high altitude and the ROLAND II short range air defense (SHORAD) systems. At the man-portable level, the STINGER with new seeker systems is intended to replace REDEYE, which is limited to tail-chase engagement of enemy aircraft.

As the Soviets have modernized their tactical air fighter force with sophisticated aircraft such as the FOXBAT and FLOGGER, the US has introduced sophisticated, high performance, but costly aircraft such as the F-15. The new light-weight fighter aircraft (F-16) recently selected by the air forces of Denmark, Norway, the Netherlands, and Belgium as well as the US is expected to provide a quantitative-qualitative complement to the heavier F-15 aircraft. Besides such improvement and expansion of the fighter force, R&D in US air warfare capabilities includes a host of efforts to improve such things as V/STOL technology; air-to-air missiles; defense suppression, both lethal and non-lethal (electronic); deepstrike and interdiction capabilities; air mobility; and reconnaissance and intelligence. Remotely piloted vehicles (RPV) R&D is only one of the more popularly discussed innovations in the latter area.

Besides such improvements in air-to-air warfare capabilities, US air R&D has given new focus to the close air support role in the development of the A-10 aircraft. This is the first and only US aircraft designed especially for this role. Previously, close air support missions were assigned to multi-role aircraft that sub-optimized the close support capability. Continued Soviet stress on quantitative and qualitative ground armored capabilities have given rise to this specialized fire support role for aircraft to augment ground fire support capabilities.

One of the single, most costly and controversial programs in the tactical warfare area is the much-discussed Airborne Warning and Control System (AWACS). This program, costing just under \$200M in FY75, is intended to fill a gap — especially in the NATO environment — for early warning of hostilities, for surveillance to support both defensive and offensive operations, and for integrated command and control and battle management. The importance the US Department of Defense attaches to this program derives from a variety of concerns about quantitative and qualitative characteristics of Soviet and Pact systems and the need to provide enhancement to US and NATO qualitative advantages in several key system areas by significantly improving the capacity to manage and control these systems in wartime.

Quantitative as well as qualitative improvements in Soviet naval armaments and forces constitute the dominant threat environment for which the principal US naval R&D programs are undertaken. Dr. Currie summarizes the Soviet naval developments of greatest concern as: (1) development of a major tactical submarine fleet with nuclear power replacing diesel power; (2) development of a large force of long-range, land-based, naval aircraft; (3) development of a large force of surface combatants armed with effective anti-ship missiles; and (4) an extensive worldwide surface surveillance and command control capability (Ref. 13, p. VI-90).

A large array of US naval R&D programs are underway to counter and improve US capability to protect sea lanes, ensure sea transport resupply to NATO, provide carrier-based aircraft reinforcement to NATO, and support crisis management with a flexible naval response. One qualitative deficiency in US forces in comparison to Soviet forces is the absence of an operational antiship missile capability. The all-weather HARPOON and the daylight (electrooptically guided) CONDOR missiles are priority developments in this respect.

With increased Soviet naval air capability (including long-range, land-based systems and possibly the BACKFIRE in this role), fleet air defense programs are also given high priority. Specific weapons developments include the introduction of the F-14 fighter and the E-2C early warning aircraft. The expensive, high performance F-14 is expected to be complemented by a lighter, less costly Navy Air Combat Fighter comparable to the Air Force's F-16 ACF. Also in the area defense

category is the AEGIS integrated, detection-to-kill system that is being designed to provide a high-rate missile firing capability along with a defense coordinating role. Several self defense antiship missile defense (ASMD) missiles are also under development.

Naval R&D also includes, of course, the search for innovative and advanced-technology naval vehicles to counter new Soviet capabilities to project power ashore as well as to develop ocean control capabilities. Two development programs in this area are the NATO Patrol Hydrofoil Missile Ship (PHM) and the Amphibious Assault Landing Craft (AALC). The first, a cooperative development program with West Germany and Italy, has encountered serious production cost problems which make its future uncertain. The latter is a 50-knot air cushion vehicle with a true amphibious capability. These two programs indicate the importance given to two lines of technological development in naval capabilities: advanced hydrofoils and surface effects ships.

From this survey of qualitative improvements in US land, air, and naval systems in the face of Soviet qualitative and quantitative improvements, it is clear that a technological-qualitative competition of rather large proportions does exist between the superpowers in the area of conventional armaments. Introduction of some of these systems will appear destabilizing enough to specific components of the overall military balance to stimulate counter-developments by the other side. However, this very competition itself tends to keep the impact of any particular development relatively small in the overall military balance. In the absence of agreed qualitative constraints, therefore, qualitative competition appears on balance to be "macrocosmically stabilizing" and "microcosmically destabilizing."

#### NATO-Warsaw Pact Competition

Competition in conventional weapons development between NATO and the Warsaw Pact as alliance systems is, in many respects, a reflection or extension of the competition between the dominant partners of each alliance. The military balance between NATO as a whole and the Pact as a whole is similar to the balance between the US and the USSR in both quantitative and qualitative respects.

There are at least two important respects, however, in which qualitative competition is quite different. First, several countries of Western Europe — particularly, the Federal Republic of Germany, the United Kingdom, France, and to a lesser extent Italy — have advanced-technology industries that can support and make use of an array of military R&D. The economic incentives of supporting indigenous employment and using industrial capacity are relatively high in these countries, which — in comparison to the Eastern European Pact countries — can also fulfill large consumer demands. Second, the voluntarism of the NATO

alliance has meant that members are freer to select the systems that fulfill their material requirements on a national basis. These two characteristics of NATO in comparison to the Pact have led to competition within NATO in qualitative improvements in armaments.

Competition within NATO in military R&D and in production has led, within the military forces of NATO, to the proliferation of weapon systems designed to do the same or similar functions and to lack of standardization and interoperability — the bane of military planning within NATO — and had led the former SACEUR, General Goodpaster, to aver that lack of standardization reduces NATO's combat effectiveness by as much as 30 to 50 percent in some areas. On the other hand, competition in military R&D among the NATO countries has been a spur to the "technological initiative" that spokesmen such as Dr. Currie regard as vital to the West.

Competition in qualitative improvements among the NATO partners has been abetted in recent years as arms sales outside of NATO have enlarged for a variety of complex military, political, and economic reasons discussed elsewhere in this report.

#### Arab-Israeli Competition

The competition between Israel and its Arab neighbors is one of the fiercest of modern times. In contrast to the US and USSR and the major states of Western Europe, the Middle East countries have been almost totally dependent on arms supplied from other countries for this competition. The Arab states lacked both the technological base and the industrial production base necessary to develop an armaments industry of their own. Israel, on the other hand, has from its inception as a state pursued a variety of programs to modify, develop, and otherwise improve on the quality of arms available to it with a view to adapting them to its particular defense needs and to reducing, where possible, its total dependence on arms suppliers.

This situation of long-standing is now in process of change under the impetus of US initiatives to detach Egypt, Syria, and Iraq from Soviet influence. The US initiatives have been supported by such traditionally pro-Western states as Saudi Arabia and Iran, which have strong interests in reducing Soviet influence throughout the Middle East. Simply put, the problem is that if Egypt, Syria, and Iraq are to be detached from dependency on the USSR, they must have alternatives for satisfying their legitimate defense needs. One alternative is to develop an indigenous armaments industry, and Egypt is in the process of starting to do this, with assistance from Arab League friends, Western European countries, and to a far lesser and ambiguous extent, even the United States.

It will be years before an Egyptian (or Arab World, as some envision it) armaments industry could have a significant impact on the military balance between Israel and its neighbors. Meanwhile, Israeli capabilities to modernize and adapt old weapons, including captured arms of Russian origin, are likely to continue to grow. Israel seems intent on developing indigenous capabilities to manufacture high-performance, jet-fighter aircraft and conventionally armed, surface-to-surface and air-to-air missiles (e.g., the Jericho and Shafrir). It is likely that Israel may enlarge its role in world-markets as a seller of specialty items — e.g., the Uzzi light automatic weapon, for which it has already achieved a measure of renown.

Despite these developing trends in Arab-Israeli capabilities to produce armaments of various sorts, both the Arabs and Israelis will remain dependent on foreign suppliers for major weapons and weapons systems. The dependency will continue for the indefinite future for multiple reasons, not the least of which is lack of sufficient resources to develop and sustain the types of research and industrial facilities required to engage in a broad range of armaments production. Appendix B presents data on the shifting patterns of the types of arms supplied to Middle Eastern countries and on the sources of supply.

Briefly, the patterns of who does the supplying and what is supplied can be seen to change significantly between the Middle East wars. Beginning in 1955 with the supply of Czech arms to Egypt and accelerated by the war of 1956, the Arab so-called "radical" states became increasingly dependent on quantities of arms supplied by the USSR and other Warsaw Pact countries. Many of these arms were of relatively low quality representing arms that were being phased out of Pact forces as they modernized. Following the 1967 war, in which the air and armored forces of Israel took such a vast toll of Arab armaments, Arab imports of qualitatively-improved, high-performance weapons took on increasing importance. In this period Egypt and Syria were dependent almost solely on Soviet supplies of modern weapons. The 1973 war revealed the military impact of high intensity combat between forces armed with qualitatively improved armaments on both sides. Since the 1973 war, which also revealed the great dependence of Western Europe on Middle East oil, armaments inventories have been replenished but with the pattern of Arab reliance almost solely on Soviet supplies significantly broken.

Because the competition between Israel and the Arab states — and, significantly among the Arab states — has become qualitative as well as quantitative, a future war in the area could be extremely explosive in its intensity. Because political alignments are fluid and dynamic — partly because of and partly contributing to competition among Western Europe as well as US and USSR arms supplies to the region — it would appear to be theoretically possible and pragmatically desirable to limit both the level and geographical extent of any future fighting in the Middle East through constraints on both the quality and quantity of arms supplied to the countries in the Middle East.

There is probably no other area of the world, however, in which military, political, and economic factors of such great complexity are mixed in such a way as to make qualitative improvements in armaments appear to continue to be desirable if not "necessary" to the states of the area. Israel appears, at present, to be linking further military withdrawals from occupied Arab lands to the acquisition from the United States of some of the most sophisticated, nuclear-capable weapons systems which the latter produces — i.e., the most advanced, high-performance jet aircraft and the Pershing surface-to-surface ballistic missile. Egypt, on the other hand as a leading Arab state, is apparently willing to accept some loss of Soviet arms supply, as long as other suppliers are available to a degree that will enable Egypt to maintain a politically significant military capability and provided the United States continues to exert pressure on Israel to agree to further Israeli withdrawals and the implementation of Security Council Resolutions 242 and 338. Whether other Arab states are willing to pay the same military "price" for settlement is far from clear. In fact, several states appear almost more willing to pay political prices — or use new-found political leverage with the outside world — to enhance their military capabilities.

#### Latin American Competition

In terms of both expenditures and force levels the countries of Latin America (exclusive of Cuba), have defense establishments that are among the smallest in the world. (See Appendix C for details.) In 1973, Latin American military expenditures totalled about 3.2 billion dollars, and arms imports during the period 1964-1973 totalled about 2.3 billion. In comparison, the Middle East spent over six billion dollars in 1973 and imported almost 9.5 billion dollars during the same ten-year period. The relative burden, or the proportion of military expenditures to gross national product, for the entire Latin American region, is one of the lowest in the world. From the Latin American point of view, however, arms competition appears to be a very real problem, primarily in terms of the increased costs of sophisticated weapons and their limited utility in the region.

The major arms competitors in Latin America are Argentina, Brazil, Chile, Colombia, Peru, and Venezuela. These six states accounted for almost three-fourths of the arms imported during the period 1964-1973. With Mexico and Cuba (the other two major powers in Latin America) they accounted for almost 80 percent of the region's gross national product, 84 percent of the population, and 93 percent of the military expenditures in 1973. Mexico, although the second richest nation in Latin America, has chosen to maintain relatively modest force levels. In 1973 only 0.7 percent of its GNP was devoted to military expenditures. Cuba is not included in this discussion because — although a significant military power — both its special relation to the USSR and its proximity to the US insulate it from the dominant patterns of competition in Latin America.

After World War II and during the 1950s, the principal threat to the hemisphere was viewed as the Soviet Union. The US, in its role of almost sole supplier, provided a large quantity of post-war materiel to the Latin American armed forces. During the early sixties, however, as the major South American powers began developing the capacity to pay; the military establishments became increasingly dissatisfied with aging, obsolete equipment; and arms competition took on a character marked more by qualitative rather than by quantitative improvements in weapons and systems. Unilateral efforts by the US to stem this trend resulted in a rapid proliferation of Western European arms sales in the region. France became the leading supplier of sophisticated jet aircraft such as the Mirage III and also the leading tank supplier with her modern AMX-30 medium tank. The Soviet Union has also recently entered the market (1974) in supplying T-55 tanks to Peru. The United Kingdom became the chief supplier of modern warships, including the Type 42 guided missile destroyer and the "Nitheroi" and "Leander" class frigates. Germany is challenging the UK's "Oberon" class submarine with its Type 209. As late as 1971, authorities were pointing out the virtual lack of guided missiles in the region. This situation has changed drastically — all of the major nations, except Colombia, have some combination of surface-to-air, surface-to-surface, air-to-surface and air-to-air missiles. These missiles are being supplied by the US, UK, France, Italy, Australia, Israel, Germany, and Sweden.

If pending armaments orders are any indication, the future is not encouraging with respect to self-restraint. Argentina has ordered new destroyers and frigates armed with the British Seadart SAM and the Israeli Gabriel SSM. Brazil seeks the American F-5E Tiger II jet fighter as does Chile, Colombia, Peru and Venezuela. In addition, Mirages and Xavantes are also on their way. Brazil has ordered six "Nitheroi" class frigates armed with Seacat, Exocet, and Ikara missile systems. Peru has four missile armed frigates scheduled for delivery; and Venezuela has pending the acquisition of two new subs, four frigates, and six fast patrol boats — the latter two types being armed with the Otomat system.

The armed forces of Latin American nations are no longer satisfied with obsolete, second rate weapons and systems; and these countries, to varying degrees, are actively engaged in programs of qualitative improvement of their land, sea, and air power. The predominant competition pattern continues to be the interaction between Brazil and Argentina, although the latter's political and economic problems may have caused the somewhat sporadic response to Brazil's steady economic and military growth. Chile is beset by similar problems; and her attention appears to be divided between the Argentina situation on one border and the rapid rise in strength and influence of another traditional rival, Peru, on another border. Peru's actions in the military arena seem designed to complement her political bid for the leadership of the Andean group in order to offset Brazil's expanding potential for continental hegemony.

Venezuela appears to be arming somewhat independently, though certainly not in isolation from the others, perhaps because of her role in OPEC and her economic growth as well as her more Caribbean outlook.

The possible reasons for competition in Latin America are complex and are discussed in detail in Appendix C. While the hemispheric or overt external threat to the Latin American nations has receded in recent years, the internal threat to domestic security has not. This, coupled with the primacy of the political role of the armed forces on the domestic scene and the great importance that prestige holds not only on the international front but internally as well, influences directly the demand for armaments in Latin America. Also important are the effects of the economics of the situation, in terms of allocation of resources and the diversion from alternative development and the good and bad effects of competition among suppliers.

The Declaration of Ayacucho by the Andean group of states in December 1974 is a good illustration of the potential utility of qualitative constraints on armaments competition in the region. These nations have apparently realized that opportunity costs of sophisticated weapons acquisitions divert scarce resources from pressing social problems and have called for a limitation on transfers of "sophisticated" and "offensive" weapons into the region. The success of this Latin American venture will depend, however, in large measure on the vigor of the follow-up by the participating states and on the arms policy of Brazil (not a participant) and its attitude toward the declaration.

#### Indian Ocean Competition

The size of the Indian Ocean, as well as the number and diversity of its littoral states, increases the difficulty of generalizing about the nature of any qualitative competition in the area. While the ocean itself is the major feature shared by all the littoral, it has also been the major avenue of penetration by external powers. Thus, the Indian Ocean can be seen as a single entity only in the context of navies and seapower. Within this context, there are three broad aspects of arms competition: (1) the US vs the USSR, reflected by the presence of their naval forces in the region; (2) the relations among the many littoral states; and (3) the relations between the littoral states and the US and USSR.

The region has become a competitive arena due largely to: (1) British withdrawal of its military forces from "East of Suez;" (2) the growth of the Soviet navy and the decision to deploy Soviet naval units to the Indian Ocean in the wake of Britain's departure; and (3) a growing US awareness, prompted by the 1973 Middle East War, of Western and Japanese dependence on Persian Gulf oil and the potential vulnerability of sea LOCs between Europe and Japan.

Both US and Soviet naval activity in the Indian Ocean have increased since 1968, with qualitative as well as quantitative improvements in naval capabilities deployed to the region. Soviet naval "ship days" in the Indian Ocean have steadily increased, from virtually none before 1968, to 6000 by 1972 and almost 8000 in 1974. During the same period, US naval ship days rose from approximately 1800 in 1968 to almost 3000 in 1974. An upward trend is also indicated by the number of port calls made by US and Soviet naval ships each year to Indian Ocean ports. Deployments of both US and Soviet naval forces to the region since 1968 also indicate a trend toward qualitative improvement in naval capabilities. The Soviets at one time or another have sent missile ships and helicopter carriers to the Indian Ocean and have developed a relatively extensive network of naval support facilities along the major international sea LOCs. The US at times has dispatched aircraft carrier task forces and has plans for developing a naval logistical support facility on the island of Diego Garcia. It is probable that both nations have occasionally deployed nuclear powered submarines to patrol in the Indian Ocean. (See Appendix D for a more detailed discussion.) The motivations behind this trend are not nearly so clear as the trend itself. In general terms, the Soviet motivation may be to gain a military advantage over the US and Western Europe as well as the PRC. An increased Soviet naval presence may be the forerunner of Soviet attempts to increase its political and economic presence in the area. The US, on the other hand, appears to be motivated by the desire to maintain or expand Western influence and to balance the Soviet presence.

Arms competition among Indian Ocean littoral states, as a regional issue, exists — in the context of naval power and indigenous navies — only at a very low level. Although there have been and continue to be a variety of tensions among Indian Ocean states, the absence of significant capabilities for projection of seapower among the littoral states leaves little or no potential for major military conflict on land or at sea between non-neighboring countries.

During the past decade there has been a trend among littoral state navies toward the acquisition of "light forces" (e.g., fast patrol boats) while reducing or holding steady the number of older, larger warships in their inventories. The trend in armament for these smaller ships is toward shipboard antiship and antiaircraft missiles, which may be perceived by the local navies as a relatively inexpensive means of qualitatively improving their force capabilities. Furthermore, if there is a threat from the sea, it is perceived by the littoral states as coming from navies of external powers. India remains as a major "unknown." It already has a limited naval projection capability to conduct operations against neighboring Pakistan, Bangladesh, Burma, and Sri Lanka, and may be motivated to complement a nuclear capability with an expanded navy. Iran's naval expansion appears to be primarily aimed at predominance in the Persian Gulf, but, like India, Iran is known to be concerned about superpower presence in the Indian Ocean.

US and Soviet naval deployments to the Indian Ocean since 1968 indicate a trend towards increased capabilities to project power ashore in the region. Soviet amphibious warfare ships first entered the Indian Ocean in 1969, and their presence grew from approximately 100 ship days in 1969 to over 300 by 1973. In 1974 the Soviet helicopter carrier, Leningrad, was deployed to the area. US amphibious support ships were first deployed to the region in 1971.

Aircraft carrier task forces have been conspicuously deployed to the Indian Ocean during the 1971 India-Pakistan War and the 1973 Middle East War. The threat posed by US/USSR capability to project power ashore is not as relevant to direct US-Soviet naval confrontation as it is to the relationship between the US or USSR and the littoral states.

#### SOME TENTATIVE HYPOTHESES

This review of inferable motivations for seeking qualitative improvements in conventional armaments, of problems of determining the costs in resources and opportunities nations are willing to expend for qualitative improvements, and of existing regional arms competition suggests several tentative hypotheses about qualitative improvements that are relevant to both the desirability and the feasibility of placing qualitative constraints on conventional armaments.

1. Qualitative competition between highly industrialized states such as the US and the USSR, and to a lesser extent their NATO and Warsaw Pact allies, in the absence of mutual and verifiable constraints, tends to be macrocosmically stabilizing. Both sides have the capacity and high military incentives, because of perceived threats, to maintain vigorous R&D programs to improve their armaments: the US, partly to help offset perceived quantitative and geographic asymmetries that favor the USSR and the Pact; the USSR, partly to preserve or enhance a quantitative military advantage and partly to achieve more political leverage by closing a perceived technological gap.

2. Economic incentives — though of secondary importance in comparison to perceived security needs — reinforce other incentives to achieve qualitative improvements among highly industrialized states. These incentives include substituting technological improvement for increasingly costly manpower and achieving product improvement with lower unit life-cycle costs. These are not readily or clearly achievable for most states without large-scale production. Particularly for the smaller industrialized states, this requires markets beyond the immediate security needs or budget of the producing state and tends to push the states and their industries into foreign sales. The incentives to reduce unit life cycle costs and to achieve economies of scale, in turn, are reinforced by desires to retain a technological-industrial capacity and full employment and a desire to offset, partially, unfavorable balances of payments that result from dependence on raw material imports.

3. Among states less favored with a sophisticated R&D capability and industrial capacity, qualitative improvements in conventional armaments are achieved through import. There are very high security incentives to acquire the best, high performance systems the market offers among states such as Israel, Egypt, Syria, and Jordan where the potential for conflict is high and imminent. Even where this conflict potential is not so obvious — for example, in Latin America — arms-importing states may find their inventories improving qualitatively simply because the market now offers (for reasons cited in 2 above) sales competition in high-performance systems. The economic incentives among competitive producers of arms to offer "the best" are supplemented (or in some cases, for example, the US and USSR, dominated) by incentives to build friendships and alliances and/or dependencies that appear to lead to influence and leverage in the recipient state. Where security tensions and conflict potential are high, as in the Middle East, qualitative constraint may depend principally on suppliers' constraints, which, to be sure, would face formidable economic and political obstacles deriving from the national interests of the suppliers. In areas where tension and conflict potential are comparatively lower, as in Latin America, qualitative constraints devised by consumers for economic reasons associated with developmental priorities would appear to have a better chance of success than producers' and suppliers' constraints.

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## Chapter 4

## THE POTENTIAL UTILITY OF QUALITATIVE CONSTRAINTS

## GENERAL

The evidence seems convincing that arms competition — unconstrained by formal or tacit agreement — will have a qualitative dimension of increasing relative importance in all areas of the world. Technological and industrial advances make this phenomenon possible; interstate rivalries and, to some extent, economic constraints on quantitative competition make this appear inevitable if not necessary.

Although the driving technological advances come from the highly industrialized states, the qualitative aspects of arms competition seem no less important among lesser developed states in the last quarter of the twentieth century. In fact, as high technology armaments have become available to these states by grants or sales, the qualitative aspects of arms competition become almost more significant among less developed states than among the highly industrialized states.

Supported by technological assets and relatively high military R&D budgets, qualitative competition between states such as the US and the USSR can be seen to be militarily stabilizing as both sides — pursuing a goal of technological initiative — seek to improve or enlarge their deterrent and war-fighting options and capabilities and to offset the other side's corresponding developments. It was concluded in the previous chapter that qualitative competition in this context is likely to be microcosmically destabilizing, sometimes leading to costly programs of research and occasional restructuring of forces on both sides, while at the same time being macrocosmically stabilizing, yielding no "breakthrough" or major confidence-giving military advantage to either side.

Qualitative arms competition, on the other hand, can be macrocosmically destabilizing in an area such as the Middle East as the wars of 1967 and 1973 reveal in opposite ways. Confident of their overall qualitative superiority as a combination of arms, maintenance, training, and motivation, the Israelis found it prudent to preempt against the threatening quantitative superiority of Arab forces in 1967. With a significant qualitative improvement and a rough qualitative balance in armaments to undergird quantitative superiority, the Egyptians and Syrians felt they could seize the military initiative in 1973. Qualitative improvements in land and air forces remain vital to the outnumbered Israelis; Egypt, Syria, and, to a lesser extent, Jordan are unwilling to concede a favorable exchange rate to Israel and imply to their populations that they are willing to accept higher military and civilian casualty rates than they

could inflict. Other states in the Middle East — some greatly enriched by oil wealth — compete qualitatively for a variety of security, political, economic, and prestige reasons.

The competition in Latin America, while not nearly so intense, has become qualitative more than quantitative in recent years as capabilities have been upgraded more than sizes of forces have grown. Here too, the new character of the competition appears potentially destabilizing as the Declaration of Ayacucho has acknowledged.

Given the importance of qualitative improvement to states engaged in arms competition, the question is what is the potential utility of qualitative constraints? Is the evidence that states will continue to compete qualitatively so overwhelming that it appears fruitless to repeat many of the frustrating attempts of the past to negotiate qualitative constraints even on those armaments that appear to favor the offense and, thus, potential aggressors? Or on armaments that appear to be particularly destructive or inhuman? Or on armaments that appear to be so costly that acquisition of them amounts to a major diversion of resources away from the solution of pressing problems of hunger, poverty, and inadequate economic development?

This chapter addresses the potential utility of qualitative constraints on conventional armaments by examining: first, some of the preconditions that appear necessary for negotiation of constraint; second, the possible objectives of agreed qualitative constraint and the criteria of desirability they imply; and, third, considerations of implementation, enforcement, and assurance of compliance and the criteria of feasibility that they imply. Although it is recognized that tacit agreements for mutual constraint operate in some competitions, the focus of interest is on the potentiality of formally negotiated agreements.

#### PRECONDITIONS FOR NEGOTIATION

Previous experience in arms control negotiations has shown that, for potential agreements to be either desirable or feasible in the broad sense, there must be some convergence of interest in agreement among the parties to agreement. Agreements imposed by victors on the vanquished have not lasted long and have frequently stirred resentments that have increased the likelihood that the agreements would be violated or abrogated. Similarly, agreements to control arms improvement and build-up, associated with ceasefires in which there was no clear victor, have been easy and convenient to violate in Korea and Vietnam, for example.

For agreements to be politically feasible of attainment and implementation there must be some minimum degree of mutual or common recognition that a constraint agreement is more desirable than the "unconstrained" competitions that might ensue in the absence of agreement.

There is general consensus in the arms control literature on this apparent truism. What is problematic is the issue of what makes a constraint agreement appear to be desirable to any state. Obviously, also, what is desirable to one state may not be desirable to any other state — especially an adversary. Arms control negotiations may be proposed and conducted by a state to preserve a unilateral military advantage against erosion or to secure one that did not exist before, but such attempts are likely to be recognized by other states for what they are and rejected. Similarly, they may be attempted — with equal likelihood of success — as a feint or a tactic in a larger political-military strategy of competition. Where such unilateral interests dominate attempts at negotiation, arms control policies are likely to fail in achieving agreement or constraint though they may succeed in serving propaganda or other political purposes.

The focus in this study is on arms control policies and proposals that can genuinely be seen to aim at control or constraint mutually sought by the parties to an agreement. In a regional competition that depends on the external supply of arms, it may be necessary only that all arms suppliers find it in their mutual interest to freeze an existing balance, whether stable or not, by foregoing the supply of improved or additional arms to the contenders. For constraint to be a common or mutual aim of parties who are themselves direct contenders or adversaries of roughly equal size and industrial development, however, a condition of perceived stability and relative balance of military capabilities appears to be necessary for the success of negotiations. Moreover, the constraint or constraints proposed would have to affect the parties in ways that are comparable or mutually desirable. This is not to say that an arms control agreement can only preserve the status quo; it is to say that an agreement is likely to be successful only if the parties find the status quo to be relatively acceptable and aim to avert potential, future imbalances more than to adjust current imbalances.

There are at least two important exceptions to this generalization. First, there may be circumstances in which both sides are comparably dissatisfied with the status quo even though it may reflect a certain balance. If the status quo balance contains features that place a very high military premium on surprise and initiative on both sides, the balance may be dynamically unstable tending toward an outbreak of war that neither side really wants. This may now be the case in the Middle East. In such a circumstance a qualitatively designed constraint on permitted forces may be more important than a quantitatively conceived constraint. The second circumstance is one in which differing aspects of the "balanced" forces may appear particularly threatening to the opposing sides. Warsaw Pact armored forces and NATO quick reaction alert (QRA) theater nuclear forces may be such particularly threatening forces. In this case, too, a qualitatively designed constraint may be more important than a quantitative constraint. The second case differs from the first in requiring a tradeoff in differing qualitative capabilities rather than a symmetric agreement to forego similar qualitative capabilities.

Whether a balance is to be more or less preserved or altered in ways that both (or all) sides find generally acceptable, problems of assessing rough equivalences of existing or foregone capabilities are likely to complicate the design of an agreement and its negotiation and implementation. Problems of assessing force equivalences have plagued almost all arms control negotiations. They have been particularly difficult for past negotiations in which qualitative considerations have played a major role except outright bans on weapons such as in the chemical and biological agreements. If negotiations of future qualitative constraint agreements are not to bog down in a mire of inconclusive calculations of force equivalences, they will probably have to be designed in such a way that minimizes the importance of such calculations. This places something of a premium on bans or exclusions of particular qualitative characteristics as compared to ceilings, trade-offs, and reductions. The dilemma is that the latter may be more desirable from a military balance point of view, while the former may be politically (and technically) more feasible to negotiate and verify.

#### OBJECTIVES OF QUALITATIVE CONSTRAINT

If it is accepted that negotiability of an arms control agreement depends on a convergence of interests among parties to the agreement, then the objectives of any constraint must be perceivable as the same or similar for all parties. The objectives do not need to be perceived as identical or held with the same degree of interest by all parties, but — unless part of some larger set of negotiations or diplomacy in which tradeoffs are possible — negotiations will almost inevitably deadlock or fail unless all parties perceive they are achieving comparable objectives.

Arms control policy is frequently regarded as only an aspect of national security policy, aimed at achieving the same kinds of objectives that military policy seeks but using alternative means. Both aim at enhancing a nation's safety or security; both aim at maintaining an adequate degree of international stability for its own sake (whether "world order" or "peaceful coexistence") and to undergird national security. In this light, arms control is frequently viewed as representing what a nation would like to achieve if others played by the same rules, while maintaining an adequate military posture is what a nation must do since others cannot be counted on to play by the same rules.

Prudent military policy is based on identifying present and future threats to the nation's safety and international interests and making adequate preparations, under constrained resources, to meet them. Such threats are associated with the nation's principal adversaries and consist principally of their known military capabilities and potentialities, the political and economic programs and policies on which they are based, and the evident or inferred intentions that underlie them. Prudent arms

control policy acknowledges these bases of military policy but is based also on attempting to identify threats to the nation's safety and interests that lie in the adversary relationship itself or in factors and trends that cut across national boundaries to "fuel" the adversary relationship. If these can be correctly identified (in, for example, "arms control impact" analyses), they can contribute to a measure of unilateral self-restraint in a nation's security posture and policy. If they can be acknowledged, in comparable terms, by adversaries, then a basis for negotiated control or constraint exists.

Formally, the categories of objectives that may be sought through arms control policy overlap to a large degree with the kinds of objectives that are sought in military policy. The principal categories common to arms control and military policy are: (1) to reduce the likelihood of war; (2) to reduce the destructiveness of war if it occurs; (3) to reduce the cost of preparing for war; and (4) to reduce political tensions. Each of these is discussed below with particular reference to qualitative constraints and how they may serve such kinds of objectives.

These categories, of course, are circumscribed by the requirement for successful negotiation discussed in the preceding section that they can be sought in common by adversaries. The following discussion would be misleading, therefore, if it were not acknowledged that there is at least one critical area in which the categories of objectives for military policy and arms control policy do not overlap — at least in the same way. That is, broadly, to enhance the linkage between a nation's international political interests and its military strength. Arms control inevitably weakens this linkage and can be construed as a constraint on political-military policy and not merely on military capabilities. Conversely, a nation seeking to gain net political advantages from its military posture will view arms control as a constraint, not willingly accepted, on such an objective.

#### Reduce the Likelihood of War

A central theme of arms control literature of the past two decades is that arms control is needed to reduce the likelihood of war. To a large extent the centrality of this theme derives from consideration of the nuclear-strategic balance, which is viewed by many analysts as containing tendencies that — if uncontrolled — greatly increase the likelihood that war will occur. Different tendencies are identified as potential triggers of war, for example, efforts to build a first-strike capability that might lead the other side to preempt, efforts to build a limited nuclear war-fighting capability that might make nuclear war seem less horrifying if not attractive, lack of adequate political and technical control over capabilities that might lead to war by accident or miscalculation. Such tendencies are described as

destabilizing, and arms control is proposed as a way to curb these tendencies by mutual accord.

Formulated as an objective related to tendencies within the military balance among states, to reduce the likelihood of war can be a high-priority objective that all parties to an agreement can hold in common. In the superpower, strategic balance, this common objective is generally held to be the basis of SALT negotiations. Besides attempting to put a ceiling on a strategic arms race, the ABM Accord of 1972 and the Vladivostok tentative agreement of 1974 focused on qualitative elements of the strategic balance that were regarded as potentially destabilizing — namely, ABM and MIRV.

Whether reduction of the likelihood of war is also an operationally meaningful objective of control of conventional armaments is more problematic. It was concluded in Chapter 3 that the qualitative competition in conventional armaments between the US and the USSR and between NATO and the Warsaw Pact is, on the whole, macrocosmically stabilizing rather than destabilizing. Qualitative competition in that high-technology arena may require that both sides continue to make qualitative adjustments in small and even large segments of their military forces, but it is not likely to yield either side high-confidence that any decisive development or breakthrough has been achieved or to increase the chances that war may break out by preemption, miscalculation, or accident. Quantitative competition in that arena — if the Soviet Union continues to enlarge armored forces, for example — is likely to prove more destabilizing in this macrocosmic sense. Therefore, reduction in the likelihood of war is not a convincing objective for qualitative constraint on conventional armaments in the US/USSR, NATO/Warsaw Pact arenas.

On the other hand, competition in qualitative improvements in conventional armaments has proved macrocosmically destabilizing in the Middle East and threatens to be potentially destabilizing in Latin America. In these areas — and possibly the Indian Ocean area — reduction in the likelihood of war is a credible and potentially operationally meaningful objective of a qualitative constraint. The qualitative improvements in armaments and inventories in these areas that appear to be militarily destabilizing in the sense that they could increase the likelihood that war might break out as political tensions rise to crisis proportions are those most generally associated with offensive operations and/or deep interdiction strikes. The types of weapon systems for such activities include: high-performance long-range bombers, surface-to-surface missiles, armored vehicles, and aircraft carriers and submarines. On the other hand, qualitative improvements in systems normally used for defensive operations would generally appear to be macrocosmically stabilizing. These systems include: air defense weapons (both missiles and guns); antitank

weapons (except tank-mounted); and mines. It should be noted, however, that without rather sophisticated air defense and antitank weapons, Egypt could not have considered attacking Israel in 1973 — so even these systems can sometimes be destabilizing.

In sum, an objective of reducing the likelihood of war could be a credible common objective of qualitative constraints on further improvement and/or expansion of selected systems in areas of competition among lesser developed states. In these areas, qualitative constraints would necessarily be combined with quantitative constraints in the form, for example, of bans on the introduction of new systems, ceilings on or reductions of existing inventories of designated systems, and withdrawals of designated systems from particular areas of deployment. The criterion for designation of the new or existing systems to constrain would be systems that appear to be destabilizing because they favor offensive operations as compared to defensive operations.

#### Reduce the Destructiveness of War

A second major category of objectives of arms control is to reduce the destructiveness of war if it occurs. The bans on bacteriological weapons and on the use of chemical weapons would serve this kind of objective. Agreements on no first use of nuclear weapons would also aim at this objective. In general, any type of control that attempts to limit weapons of mass destruction or of particular inhumanness falls into this category.

In the strategic nuclear area an objective of reducing the potential destructiveness of war is sometimes seen as in conflict with an objective of reducing the likelihood of war. It is argued, for example, that the likelihood of war's occurring can be minimized only by making the mutual destruction of nuclear war so assured that neither side will ever rationally entertain the possibility of initiating war. In effect, this line of argument places civilian populations on both sides in hostage for the sake of averting war, since it seems there is no adequate defense of them anyhow.

An objective of reducing the destructiveness of war — like an objective of reducing the likelihood of war — may be served by some qualitative improvements in armaments as much as by qualitative constraints. In the nuclear area, improvements in the accuracy of delivery, because they offer opportunities to reduce collateral damage, are frequently presented in this light. A similar line of reasoning is applicable in the conventional area. Precision guidance for air-dropped munitions is a particular case in point. By permitting ten-to-one or greater reduction in the number of bombs that need to be dropped to destroy a military target, they can significantly reduce collateral damage per target destroyed. It is less clear that the overall destructiveness of war will necessarily be reduced by the introduction of such

qualitative improvements — since the other side may introduce offsetting improvements and precision guidance can be used against civilian as well as military targets — but they do appear to offer some opportunities for the control of war and its destructiveness that otherwise would not exist.

Especially in a densely populated region like Central Europe it would appear that, on balance, there are more opportunities for increasing the control of war and reducing its potential destructiveness by the kinds of qualitative improvements in conventional armaments that current technology promises rather than by constraints on them. They may be microcosmically destabilizing in the sense that they stimulate the development of countermeasures and adjustments in force mix by both sides (and, thereby, increase the cost of preparing for war), but they do not appear to be macrocosmically destabilizing.

In lesser developed regions, where the conventional balance is currently more dynamic and less stable quantitatively and qualitatively, almost any qualitative improvement in armaments seems potentially destabilizing in both senses even though it may offer some opportunities for controlling war and reducing its potential destructiveness.

In any region, the criterion for designating which qualitative improvements to constrain under an objective of reducing the destructiveness of war would be those improvements over existing capabilities that would have high collateral damage. In Central Europe, potential improvements in weapons technology tend to move toward reduction in collateral damage per military target. In other regions, given their current qualitative balance, at least two of the types of systems that appear to be destabilizing also threaten relatively high collateral damage — namely, high-performance long-range bombers and surface-to-surface missiles.

Reduction of the potential destructiveness of war by means of qualitative constraints appears to be a relatively unconvincing objective in areas of high technology but, potentially, a credible supporting or secondary objective in lesser developed areas.

#### Reduce the Costs of Preparing for War

In the previous chapter it was pointed out that little basis exists for ascribing net costs to qualitative improvements in conventional armaments that any nation may undertake. Nonetheless a credible and operationally meaningful objective of qualitative constraint agreements could be to reduce the costs of preparing for war.

Almost any qualitative improvement in armaments is to some extent microcosmically destabilizing in any environment of arms competition.

Where a military balance is taken seriously, an improvement in some force element on one side is an improvement relative to the other side and must be matched or countered by the other side if the current balance is to be maintained. Until some resource limit is reached, both (or all) sides will tend to want to retain at least what is advantageous to them in the existing balance. This action-reaction phenomenon is what prompts observers to speak of arms "races" or even "spiralling arms races." Sometimes, following Lewis Richardson's analyses as previously noted, analysts infer that the only end to this "vicious circle" is war.

There are at least two pertinent criticisms of this view of "arms races." The first is that it tends to neglect that there are in fact many informal constraints that operate against the "race" or "spiral." Not the least of these is the scarcity of resources and competing demands that do limit the costs any nation is able or willing to bear. The second is that some if not most competitions give a high priority to qualitative improvements that show the most promise of providing them with the means to defend themselves against aggression or to deter it. Technology does not automatically favor either offense or defense, but in regions of high-technology armaments there are increased incentives for technological innovation to focus on improved defensive capabilities and on provision of options. The microcosmic instabilities of many action-reaction phenomena, thus, may contribute significantly to macrocosmic stability.

Nonetheless, this can be an exceedingly costly process. A qualitative improvement in one force element on one side may throw the force mix out of balance on the other side requiring a reaction, not only of matching capabilities or developing specific countermeasures, but of extensive redesign (and reequipment) of the force mix. It is suggested in Appendix A that this could constitute a definition of a "significant" qualitative improvement. That is, a significant qualitative improvement in armaments is definable as one that requires a change in the force mix in the opposing side.

Unconstrained by formal, credible agreement, military policy and technology will constantly seek qualitative improvements that approach the limit of what resources can or will be provided. Therefore, probably the most distinctive — if not the highest priority — objective that qualitative constraint can offer is the objective of reducing the cost of preparing for war. This objective would appear to apply almost equally in areas in which qualitative competition is characterized by indigenous competition in research and new weapon developments and in areas where the qualitative competition is a competition in acquisition from external producer states.

The possibility of achieving this objective is circumscribed, however, by the costs that may be incurred for systems to assure compliance with the constraint agreement or to provide for adequate response if the agreement is violated. Seeking the objective by arms control may also deny some opportunities to achieve net force cost reductions through qualitative improvements.

#### Reduce Political Tensions

The fourth category of objectives, to reduce political tensions, is closely related to the first category, to reduce the likelihood of war. Especially if it is argued, probably convincingly, that it is political tensions rather than instabilities in military balances that cause war, the two kinds of objectives seem almost identical. However, instabilities in military balances may provide the occasion, if not the cause, for war. It is also conceivable that a war can start by miscalculation or accident. Therefore, it is useful to distinguish between the objectives of reducing the likelihood of war and of reducing political tensions.

The objective of reducing political tensions may well focus on constraining qualitative improvements that are merely irritants to one side or the other and not likely to destabilize the military balance or lead to costly programs of offsetting the improvement. This kind of objective is most applicable in regions in which qualitative competition is just beginning and the qualitative improvements that are sought can be inferred to be sought primarily for purposes of political prestige and influence. In areas of a dense military balance or intense confrontation such as Central Europe and the Middle East, it would be exceedingly difficult to identify qualitative improvements that tend toward irritation more than instability. In these contexts, constraints undertaken for objectives of reducing the likelihood of war or the cost of preparing for it appear more urgent and themselves may contribute to the reduction of political tensions far more than any constraint undertaken primarily for the direct objective of reducing tension. In Latin America and the Indian Ocean area, however, constraints undertaken for the primary purpose of reducing or averting political tension could be meaningful and significant.

#### Interrelation Among Objectives

The categories of objectives discussed above are not necessarily mutually exclusive. A qualitative constraint agreement may be conceived to serve more than one objective. Differing objectives may be held in differing priorities among the parties to an agreement. On the other hand, it is conceivable that in particular instances some of the objectives might not only be mutually exclusive but incompatible. In the strategic nuclear area this is perhaps most obvious in the line of

reasoning that seeks to reduce the likelihood of war on the basis of mutual assured destruction if war should occur. In the conventional area, a line of reasoning that would be analagous would be an argument that — given the experience of the October War of 1973 — air defense systems should be constrained in order to reduce the likelihood that an aggressor could feel he could attack with any confidence that he would be secure from major retaliation or aerial disruption of his attacking forces.

The determination of which objectives are most desirable in what circumstances and how best to achieve them (i.e., by what qualitative constraints) is a difficult job of political-military analysis. In general, in the conventional area, it would seem preferable to focus on one objective and select the systems for qualitative constraint that are critical to that objective rather than to mix objectives and increase the types of qualitative improvements the agreement attempts to cover. In fact, in some instances it may be desirable to encourage some qualitative improvements (or allow them to be unconstrained) while constraining others. This may be necessary to ensure adequate and timely response if the agreement were violated. For example, a hypothetical agreement to ban the production of advanced armor, as discussed in Chapter 6, would aim to forestall costly redesigns of force mixes including anti-tank weapons mixes. In that case, however, one may wish to allow states to change their antitank mixes anyway as a hedge against violation of the agreement on armor.

Since different and sometimes competing objectives are at stake in any potential constraint agreement, the problem of designing a desirable agreement and specifying the systems to be controlled and the circumstances of control may be likened at a formal level to optimization methodology. It would appear preferable to seek to maximize the focal objective subject to certain limits on the extent to which other objectives might be endangered. For example, an agreement that pursues the objective of reducing the cost of preparing for war would be formulated subject to the condition that it does not increase the likelihood or destructiveness of war.

#### IMPLEMENTATION, VERIFICATION, AND ENFORCEMENT

The desirability of a qualitative constraint on conventional armaments can be treated for analytical purposes as a function of whether the constraint properly implemented and complied with would achieve the objectives sought without diminishing or endangering the achievement of other valid objectives. As suggested in the foregoing this is a difficult but not impossible assessment to make. Once made, there is the further question of whether the constraint can be implemented with

adequate assurance of compliance. It is primarily in this context the feasibility of qualitative constraints is treated in this study

Four broad criteria of feasibility are postulated. These may be stated in the form of questions, each of which requires a "yes" answer for a constraint agreement to be assessed as feasible of implementation. The questions are:

1. Is the matter (activity or process, set of items or systems) designated for control distinctive enough so that there are uncontrolled matters that can perform essentially the same function with the same impact?
2. Is the matter designated for control inherently controllable in a manner that governments can be held accountable for control?
3. Can control be verified (or violations discovered) by an outside source in a reliable and timely manner?
4. Are there recourses to the discovery of violations or announcement of renunciation that can either provide enforcement of an agreement or assure timely response?

The first and fourth of these criteria are closely linked to the question of whether the constraint was adequately conceived in the first place to ensure that — if properly implemented and complied with — would achieve a desirable objective as discussed above. Because of their criticality, they are worth stating and examining under the rubric of "feasibility" as well as "desirability." They deal principally with matters left uncontrolled in relation to those that are controlled.

The second and third criteria deal strictly with what is to be controlled. They determine to a large extent the form of control, which is treated in the next chapter.

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\*The term "political feasibility" is occasionally used and refers to a prior judgment about the preconditions of negotiability and whether a common objective or set of objectives can be sought by all parties in an agreement. Thus, in this study, political feasibility is treated as a necessary condition of "desirability."

## Chapter 5

## FORMS OF CONTROL

## GENERAL

The preceding chapter considered the desirability and the feasibility of qualitative constraints on conventional armaments principally from the point of view of the objectives that could be served by such constraints. It was pointed out that the overall utility of qualitative constraints could be formulated in classical optimization terminology as "maximizing an objective (function) subject to certain constraints (limits)." Most of the dilemmas of determining what types of constraints would, on balance, be desirable and feasible derive from the potentially conflicting objectives of constraint. Even when these are resolvable in particular qualitative competitions by criteria such as those proposed, there remains the question of how best (that is, most feasibly) to control the qualitative improvement in question. Another way of putting this question is to ask "What is to be controlled?" — that is, "What activity or process is it most feasible to control to satisfy a desired objective of control?"

This chapter examines potential "forms of control" in this context. Potential forms of control are distinguished by the activity or physical process or specific product to be controlled. The forms of control presented and discussed are those that may be associated with the entire weapons "life-cycle" from commitment of resources to disposal or replacement. The feasibility of control at each stage in this cycle is a predominating concern, but questions of the desirability of controlling the type of activity that characterizes each stage inevitably arise also. The feasibility of control, moreover, is considered largely in terms of whether the form of control postulated for each stage is subject to adequate verification to give assurances to parties to an agreement that they could not be caught by militarily destabilizing technological or qualitative surprise. (For a discussion of verification see Ref. 1).

The forms of control examined include control of: (1) military expenditures; (2) research, development, test, and evaluation; (3) production; (4) procurement and distribution; (5) use; and (6) transfers. Forms based on these stages present differing opportunities and limitations for arms control purposes according to the characteristics of the particular stages themselves and according to the nature of the particular innovation or existing weapons system being considered for constraint.

## MILITARY EXPENDITURES

Some control of qualitative weapons features may result from agreements to reduce total military expenditures, since at least one stage

in the progression to deployment would probably be slowed down. Or, the pressures of competing allocation requirements under a constrained budget might cause development to be interrupted or suspended at some stage — for example, after laboratory test but before proof testing. The main arguments in favor of expenditure constraint hold that this is the simplest and most direct means of arms control, for it bypasses technical negotiations on weapon equivalences, a complex and long-drawn out process that historically has been inconclusive. Also, of course, it is pointed out that the financial and other resources saved by reducing military expenditures may be allocated to the beneficial goals of peaceful progress. In 1975, about two-thirds of the military expenditures of each of the two superpowers were estimated to be for conventional arms and forces (Refs. 2-4).

General budgetary reduction, attractive as it may seem, is a shotgun-type approach to qualitative constraints, since it provides no assurance and possibly not even any information as to what weapons or weapons features will become constrained. For this purpose, an agreement for general military budget constraint might include a specific sub-agreement to restrict or reduce the funding of weapons evolution in some manner. Alternatively, such specific agreements might be made on their own without being part of a general budget constraint. Whether general or specific, however, budgetary constraint as a form of arms control seems less feasible alone than as an accompanying, or supporting part of a substantive arms control plan. A general agreement to reduce total military expenditures may well serve some overall goals of disarmament, but it is insufficiently precise as a device for qualitative weapons controls. More specific proposals to limit or reduce funding for weapons research and procurement would promise more direct control of general qualitative improvement and competition in conventional armaments. However, under restricted funding, defense planners on all sides would have greater cause to worry whether their priorities had been assigned properly and whether the risks of a destabilizing development by another party were not greater because one's own options had been severely limited. In short, a budget constraint — whether general or specific to weapons research and procurement — would succeed primarily in narrowing the field of qualitative competition. For the superpowers, this might make the competition potentially more, rather than less, destabilizing unless both sides had rather complete knowledge of the focus of the other's constrained efforts.

Finally, verification of compliance with a constraint on military expenditures would be virtually impossible, given the significant differences among states on how they report and account for their military expenditures and the opportunities that exist for concealing military expenditures in other parts of national budgets. With the resulting low confidence in compliance, a sudden abrogation of a budget-limiting agreement could leave complying parties severely disadvantaged. On balance, attempts to constrain qualitative competition by controlling

military expenditures — even those nominally for R&D — appear quite unattractive. To control the activities of improving, producing, and deploying new weapons rather than the funding resources devoted to such activities seems far more desirable as well as feasible.

#### RESEARCH, DEVELOPMENT, TEST AND EVALUATION (RDT&E)

Proposals to control the research stage of weapons evolution represent a relatively new approach. In the past, the main stress in arms control and disarmament efforts has been quantitative — numbers of men, numbers of guns, amounts of money. The stage of weapons RDT&E has now become a favored target area of proposals for qualitative constraints on weapons. Proposals to control research have frequently sought to use budget controls as discussed above, but they have also occurred as suggestions — some quite visionary in their variations — for the controlled diversion of technically trained personnel away from military research, the closure of some government research facilities, reductions in government contracted research, reduction of security classifications on military research, free and timely interchanges of the results of unclassified research, and even self-generated organization among the scientific/technical community to boycott or avoid military research (Refs. 3-7).

Despite the academic advocacy of controls on research and military technology to constrain a qualitative race in both conventional and nuclear weapons, the feasibility of this form of control seems quite low. Verification is most difficult especially at the stage of research prior to specific weapon development. Moreover, arms control proposals (e.g., SALT) that establish quantitative limits have frequently been accompanied by expressions of commitments to maintain or even increase research in order to gain internal acceptance for the specific proposals at issue. Security-minded opponents of limitations on research and technology readily point out a need for military research to keep abreast of or, preferably, to anticipate new weapons developments anywhere, but especially by potential opponents (notably, the Soviet Union). Not to conduct pure and applied research in weapons areas can be seen as culpable neglect of national security. Graham T. Allison and Frederic A. Morris have argued:

...in a situation where one nation cannot be sure what weapons the other may be researching or even deploying, the long periods needed for development demand that prudent research anticipate threats and requirements (Ref. 6, p. 118).

Depending on the new weapon and the priorities given to it, the gestation period preceding its issue (deployment) may take as much as ten years or

even longer. Policy and decision makers do not relish the prospect of having their national forces become engaged in combat with weapons of lesser quality than could have been attained and are unlikely to propose or support measures for the deliberate constriction of military research and technology.

Paul Doty, director of Harvard's Program for Science and International Affairs, argued in mid-1975 that the feasibility of successful control in the research stage is not high because of: (1) the human inability to foresee every possible innovation and its course of development, (2) the impossibility of negotiating constraints on the great number of qualitative improvements that can be imagined, and (3) the difficulty of verification in those cases where evidence of innovation may exist or be strongly indicated. However, he observed:

A further difficulty with qualitative constraints is that, to be effective, they must be introduced prior to large scale deployment...

and that

Negotiated qualitative constraints based upon what is verifiable provide the principal means of restricting the growth of capability in a fixed number of strategic weapons (Ref. 7, p. 67).

In other words, for the strategic case, Doty argues that a balance should be sought quantitatively limiting and reducing existing weapons by type and foreswearing, not research on but, deployment of qualitatively improved weapons. Research and technology may proceed and improvements may be developed and counter-matched without violating the agreement or permanently altering the condition of strategic stability. Such improvements, however, are not to be fielded. An upgrading of qualitative characteristics among the agreed numbers of weapons would be a violation. This general line of reasoning may be transferred with modification to high-technology arms in the conventional weapons field. To control weapons research appears to be infeasible in practice and quite possibly undesirable, even though one may aim at forestalling the deployment of qualitatively improved armaments (Ref. 2, 3, 7, 8).

The test and evaluation stage of weapons development offers more possibilities for qualitative constraint. These possibilities and their feasibility are affected by and may be examined in terms of procedural substages, the type of weapon or device under consideration, and the effectiveness or military significance of that weapon.

Testing and evaluation may be administratively divided between laboratory functions and field assessment for military use. In reality,

they occur simultaneously. Initially, the concept of "testing" predominates; later, the process becomes better identified by the word "evaluation." Both subsume a spectrum of actions in the form of substages sufficiently different to provide different prospects for control. Early laboratory testing involves a pilot device or weapon, possibly one of a kind, that is turned on or fired in a laboratory experiment to see if it works. Further laboratory tests give some idea of operational characteristics—range, accuracy, rate of fire, and the like—and suggest modifications to the pilot model. A decision will be made either to reject the weapon or suspend testing or to proceed to further testing with a view to possible adoption. In the latter case, more pilot models will be acquired and extensively tested to determine performance characteristics such as ballistic data, reliability, durability, and maintenance features.

Testing now merges into evaluation by technical arms and field troops, and the laboratory researcher becomes a background observer or advisor. If it is approved after field evaluation, the weapon will be scheduled for production and issue at once or later. The foregoing sequence may vary as to substages or become telescoped in different cases, and its review is intended as conceptual rather than as an exact description of the process. It indicates, however, that innovative weapons or features may be intercepted at a number of points during test and evaluation.

Both the feasibility and the desirability of constraining a qualitative improvement at the stage of test and evaluation depend on certain characteristics of the improvement. These include, particularly, its detectability, its technological distinctiveness, and its military significance. For example, the implications of test firing a missile resemble those of test firing a new machine gun only at a high level of generality. Qualitative constraint recommendations have included a proposal that the number of missile firings per year and the range areas in which they are conducted be limited and designated. For surface-to-surface and surface-to-air missiles that require test ranges of such a size that they would be detectable by unilateral national means, such a proposal seems acceptable and feasible of implementation. Constraints on test firings and ranges are probably not feasible (and, maybe, not desirable) for weapons of lesser types than the missile category postulated above. A satisfactory degree of verification probably cannot be achieved. Furthermore, internal pressures to complete the test and evaluation stage of such arms would likely prove to be irresistible. Military leaders and others will point out that new conventional weapons having less than a strategic role are not of such international concern as to warrant proposals for constraints during development. On the other hand, such weapons would assist the soldier on the ground (sea, air) to do his assigned job and to defend himself (Ref. 5, p. 230; Ref. 3, p. 93).

The technical feasibility of establishing a control that is verifiable depends on the detectability of test firings or other field tests. The desirability, on the other hand, of such control depends more on the improvement's or innovation's technological distinctiveness and military significance. If a weapon innovation is highly distinctive technologically, it is frequently spoken of as a "breakthrough." The development of gun powder was such a breakthrough. Other major improvements in military effectiveness may appear through far more evolutionary developments as, for example, the coalescence in the late nineteenth century of metallurgical advances, successful on-carriage recoil designs, and the stable propellant. Both of these types of developments were potentially war-winning developments if confined to one side. Both required similar or off-setting developments by other competitors to avert a radically destabilizing military impact. Both of these developments were improvements that might have been desirable to control — at least for limiting the costs of developing them and of altering force mixes to accommodate them and their countermeasures. On the other hand, their potential, anticipated military significance was so high as to limit severely the desirability of foreswearing them from a military or security point of view and, thus, the political feasibility of controlling their development.

#### PRODUCTION

After a new or improved weapon has successfully passed through the test and evaluation stage without having been constrained, the possibility of preventing or delaying the development itself is past. Control agreements may be proposed, however, in the next stage—production—in a number of forms: to ban the weapon or its type outright, to refrain from initiation of production, to stop or suspend production at some point, or to slow down production under a stretch-out schedule. The feasibility of constraints in any of these forms, as at all stages, will be affected by the nature and military significance of the device under consideration, and also by a number of factors peculiar to this stage.

Feasibility will be diminished if production controls are proposed after industrial capacity has been allocated and tooled-up, contracts let, labor supply provided for, and other commitments made—for example, to the armed forces leadership or the public, or both. Regardless of desirability considerations, it may be economically and even technically quite difficult to stop production once it has started. In political terms as well, internal balances may make it difficult to endorse production constraints. Externally, the relative state of power, security perceptions, and technology among the nations concerned may make it politically infeasible for one or more of them to negotiate for constraints. The views and attitudes of a country's leadership

may be so oriented toward security through attaining arms parity or advantage as to make any consideration of constraints appear undesirable as well as infeasible (Ref. 11).

Except in the case of bacteriological weapons, past proposals to ban completely the production of a particular device or category have not succeeded in gaining adoption.\* The Biological Weapons Convention of 1972 prohibits the development, production, and stockpiling of bacteriological and toxin weapons and provides for destruction (or peaceful diversion) of those existing, along with their means of delivery. In early 1976, there were no other nonnuclear production prohibition agreements in effect that were subscribed to by the United States and most foreign countries (Ref. 9).

Although there are domestic pressures in all societies that, by competing for resources, effectively limit or "control" production of new weapons more directly than they limit RDT&E or deployment of procured weapons, there are also counter-pressures that would resist a formal agreement to control production. If a development has advanced to the stage where a design is accepted by the military leadership as offering clear advantages, production, issue and deployment would seem to be the rational course to follow to reap the return on the R&D investment. However, for reasons noted above, constraints in the production stage are generally more feasible to verify than constraints in the R&D phase (though not necessarily the T&E phase), although a complete ban on production might be very difficult to verify. Moreover, since all parties may wish to maintain a production base as a hedge against sudden abrogation of an agreement by other parties, the most acceptable form of production control might be to limit production to some maximum level, or to slow down production by negotiated scheduling. Where an approximate balance of power exists and several countries are in possession of the innovation, a slow-down in production and the limitation of production to the issue and reserve needs of the existing forces of each country or alliance system would appear to offer some opportunity for constraint.

#### PROCUREMENT AND DISTRIBUTION

Once production of an innovation has begun and is well underway, disposition of the output necessarily follows and may be considered for constraint purposes under the headings of procurement and distribution. Parties to negotiation on constraint of a particular weapon or class of weapons may conceivably agree not to procure it for their own forces either from some source not a party to the agreement, or from their own production if they are producers.

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\*Even the ABM Treaty of 1972 did not totally ban production.

Analysis of procurement aspects for the purposes of arms control is relatively easy in the case of non-producers, and is illustrated by the Latin American regional agreement known as the Declaration of Ayacucho (see App C). By this declaration, the parties, none of whom is a producer of high technology weapons, undertook not to introduce "sophisticated" weapons into their region. Because of the power balances and likenesses among these nations and their individual judgments that the agreement would not adversely affect their individual interests, the expression of constraint in the declaration was feasible. In procurement control by non-producers, perceptions of mutual interest and balance are the key factors, along with the kinds of weapons designated for control. In the nuclear field, the Non-Proliferation Treaty is another example of this kind of constraint, not limited to a region but open to subscription on a global basis. In the conventional field, this form of control might include innovative weapons of high effectiveness and cost involving serious security concerns or, at the other end of the scale, non-controversial items on which agreement may be readily secured for the sake of demonstrating good will and showing progress in arms control. Producer states might become parties to such restraints on procurement by undertaking not to supply the designated arms (see discussion below on "Arms Transfers").

The case of a procurement control among producers contains the same elements as for the non-producers agreement, but is far more complex because of the additional political, military, and economic factors incident to the in-country availability of the arms under consideration and is probably less feasible. The parties here might undertake not to obtain (or to limit the rate of obtaining) the designated arms from an outside party, or from their own production. In its complete application this form of control, while allowing production for export sales or grants, would amount to a non-use agreement and might more feasibly be approached in the more clear-cut, less-convoluted context of control by prohibition of use. The United States, for example, produces the "cheap," short-range but high-performance F-5 fighter not primarily for its own use but for transfer to selected recipients with less-advanced air forces. The F-5 example, however, reflects a unilateral United States action in no way related to arms control measures or precluding US use.

An agreement for complete non-procurement from indigenous production for one's own forces is infeasible, for it is fanciful to imagine that any state while exporting a useful instrument of war will deliberately exclude itself in advance from the use of that instrument. What is considerably less fanciful and perhaps minimally feasible would be an agreement that allowed production and national stockpiling, excluded or constrained imports, excluded (preferably) or limited exports in rate and numbers, and constrained indigenous procurement in rate and amounts for national forces.

The distribution stage, like the others, includes certain substages or variations. When products come off the line for national procurement, they move into some mix of stockage and prepositioning, limited issue, general issue, or transfer by sales or grants. Stockpiling includes the buildup through normal logistic processes of depot stocks to establish general reserves, maintenance reserves, and levels necessary for the intended scope of issue and transfer, if any. Constraint at the stockpiling stage would mean stopping or limiting further distribution of the new or improved weapon. From the verification aspect, violations—especially of an agreement to cut off all further distribution—should be comparatively easy to detect in the case of troop issue and transfer, less so for prepositioning.

Technically, the feasibility of constraints by allowing national stockpiling but limiting issue at first seems high. Practically, however, this comes into serious question because of the additional costs of maintenance for an unused weapon or device, although these problems and costs would depend to some degree on the weapon's characteristics and the quantity on hand. Holding back a weapon at stockpile levels, furthermore, is almost certain to invest it with an undesirable aura of mystery likely to produce contention and uncertainties among the armed forces. These uncertainties may involve false confidence and overconfidence in the weapon's capabilities, or the assumption that the weapon must be no good or it would have been issued, or both.

In order for troops to use a weapon effectively, they must, as a rule, train with it. Training simulators—models, dummy rounds, inert devices, etc.—may be employed; but the greater the likelihood of combat appears, the greater will become the pressures for release of the weapon itself. In addition, military leaders will point out that even in conceivable instances of ingenious technology where prior training might not be required, to keep a conventional weapon in stockage would deny its advantages to deployed forces and would prevent observation of its characteristics under the important conditions of general use, thus precluding modification for improved performance and preventing the development of smooth logistic and maintenance support in the field. Further, a weapon in storage may be bypassed by a later innovation. If this innovation is also to be held in storage, what is to become of the first one, unless the armed forces are to become primarily warehouse keepers? The first weapon may then be issued, or consigned to scrap, or transferred by sale or grant to some other country. The first course would not be credible to the nation's armed forces except as a temporary measure, the second would be egregious waste, and the third would add to the proliferation of qualitatively improved weapons—a situation exactly opposite to the purpose of constraint proposals.

In sum, constraints on qualitative improvements by withholding issue and stockpiling at the end of the production line appear to be infeasible. So many policy uncertainties and logistical-economic questions arise as to make consideration of a cut-off at this inherently fluid substage unattractive. Neither the B-36 bomber nor the 280mm gun was ever used in combat, but both were operationally deployed and served important strategic and tactical purposes until they were superseded.

A qualitative innovation that is not controlled at the production stage or prior will, then, move into some form of issue. Limited issue may be made to those units most likely to need the weapon first, with general issue to regular forces and reserves following in the usual sequence. A special case of stockage may appear through the technique of prepositioning, with quantities held in depots in possible theaters of operations and accessible to units designated to employ the particular weapon. Various forms of limited issue for training purposes are then foreseeable without serious detracting from overall military effectiveness, and a feasible form of constraint would appear to be constraint on the area of deployment.

Proposals may reasonably be devised to exclude certain weapons, and weapon trade-offs, from specified areas. Such proposals would not preclude the limited issue mentioned above, but could mean complete exclusion of the specified weapons from the agreed areas, including the prepositioning of stocks, the stationing there of troop units armed with these weapons, and of support units holding parts allowing their assembly. A proposal for less than complete exclusion would introduce many complexities for verification and would thus reduce feasibility. The measure of the constraint attained by area exclusion would depend in large degree on the size and location of the agreed areas; these factors offer room for options and flexibility for a proposal that remains anchored on the principle of total exclusion within the negotiated area. A recent example of area exclusion, both by quantity of forces and weapon characteristics, is the Egyptian-Israeli Sinai Accord of 1 September 1975.

This discussion of possible controls on procurement and distribution has assumed negotiated agreements. To assess the feasibility of such agreements it must be further assumed that the innovations to be constrained are known, at least in general nature, to the various parties. Otherwise, negotiations will not occur, since no country will gratuitously surface a conventional arms innovation known only to itself unless, and improbably, as a bargaining chip in arms negotiation poker. This truism, coupled with the rather large array of potential qualitative improvements in conventional arms, suggests an overall low feasibility for qualitative arms constraints among producer countries on procurement

and distribution to their own services. Only controls on area of deployment—which are, perhaps, more quantitative than qualitative—appear to be relatively feasible among producer states.

#### ARMS USE

The Geneva Convention of 1925 precluding its signatories from the use in war of poison gas and bacteriologicals represents the kind of control—by complete exclusion, on a global basis—particularly suitable for these weapons and distinctive to them. Both chemical and bacteriological weapons are hard to manage, difficult to target and deliver with accuracy, are non-discrete in their effects, and magnify requirements for medical support and logistics. The casualty producing effects of both can be accomplished by other weapons. Both carry the long-standing opprobrium of inhumanity identifiable at least since 1899, a condition not attaching to other weapons—even nuclear—in the same degree. These factors have been of leading importance in making use prohibitions feasible. Even so, production prohibitions exist only against bacteriologicals and toxins. Many states qualified their acceptance of the Geneva Convention by footnotes on no first-use of gas. Despite the strength of factors favoring the feasibility of tighter controls, prohibitions on the development, production, and distribution of poison gas weapons have never been attained. No other exclusions of non-nuclear weapons use are in force, and—judging from historical experience—none are likely to be feasible for existing weapons types. Agreements prohibiting the use of a revolutionary new development of mass destructiveness, however, if not attained at the test stage, would probably have both high feasibility, as well as desirability, should its general characteristics be comparable to the gas and bacteriological category.

#### ARMS TRANSFERS

The international movement of arms by sale or grant from suppliers to recipients is generally referred to under the expression, "arms transfers." Suppliers include not only producer countries, although these are the principal source, but also, second-hand suppliers, who themselves have first acquired the transferred arms by importation, and commercial arms dealers operating under non-uniform import/export regulations varying widely according to the legal jurisdictions in which these dealers conduct their operations. Recipients include not only established national governments, but also insurgent movements, factions, and guerrilla bands such as those in Angola, Lebanon and elsewhere in the Middle East, Asia, and Latin America that have arisen since World War II. The dissemination of arms to all these recipients is an extension of the procurement and distribution stage of the weapons progression. As a form of control on qualitative

improvements, the limitation by producer countries on dissemination outside their own armed forces calls for serious attention.

New weapon characteristics and effectiveness (significance) might be expected to have a close relationship to the feasibility of controls on arms transfers. The more effective the innovation, the less likely the originating country would normally be to release it through transfers, particularly before its own forces have been fully equipped and its reserve stocks established. It would not, for example, be expected that a true breakthrough weapon would be released to the transfer circuit. The size of the innovative weapon or device would also be a factor; large and bulky items, for example, are subject to relatively easy detection and verification.

These sorts of considerations should enhance the feasibility of transfer controls and in the past history of arms transfers have been broadly applicable. The sale or grant of arms to developing countries for some time after World War II typically involved second-line or used equipment that had become surplus or outmoded in the producer states, who generally retained first-line weapons and new developments for themselves and, possibly, their allies. This practice was fostered by the fact that the armed forces of many recipients lacked the technical capability to employ and maintain sophisticated weaponry, although those specimens they could obtain were useful for prestige and show purposes. Nevertheless, even second-line or surplus standard weapons were usually qualitative improvements for the recipient countries and often within their geographical regions as well. This relativity factor continued to be applicable in 1975—that is, weapons that may no longer be considered new or innovative among advanced industrialized states may still be comparatively so advanced in lesser developed regions as to be destabilizing (or stabilizing, depending on the situation and viewpoint). (See Appendix B)

By the early 1960's, however, the older patterns and expectations in arms transfers were changing rapidly as a result of the alliance and clientage systems of the Cold War and the growth of insurgency movements. The pace of conventional arms acquisition by transfers had broadened greatly in scope and expanded in volume, and in 1975 this trend was continuing. In many cases, recipients' technical capabilities for using complex armaments and their capabilities to pay for them, as a result especially of oil wealth or subsidies from friendly oil rich states, had substantially increased. Demand now emphasized quality as much as quantity, if not more so. For example, before departing on his visit to the United States in October 1975, President Sadat of Egypt stated to the Egyptian Parliament:

I want to put on record here our concern and opposition to every escalation by America in arming Israel—particularly in regard to quality of the weapons. Escalation by one side will have to be met by escalation from our side, and the consequences in this connection are obvious to all (Ref. 10). (Emphasis added.)

As discussed in Chapter 3, the motivations of arms transfer suppliers are political, military, or economic or all of these. Political motivation includes the strengthening of allies or clients in exchange for their support and alignment, and the extension of influence. This latter motivation may be defensive as well as offensive. That is, a situation of instability may induce a superpower (or other power) to enter an arena primarily to preempt control or influence before it becomes established by another state. The second power, similarly, acts or reacts against the first. Politics, like nature, abhors a vacuum; and political motivations generate commitments. Military motivations favoring arms transfers are generally encompassed within the political, but may include the objectives of surrogate field use as tests for further development and of sustaining production capacity at home. Economic motivations include support to domestic economies and bolstering of supplier governments' treasuries by profits from arms sales.

In the face of the strength of such motivations and present widespread proliferation by transfers, how feasible are constraints designed to control the transfer of qualitatively improved weapons? It is difficult to imagine technical reasons that would preclude or seriously hamper control of transfers. Economic obstacles—for example, pressures to recover production costs by sales—will prove to be more difficult but cannot be regarded as insurmountable. Nations have the sovereign (legal) power, if they choose, to constrict the operations of private, commercial arms merchants. No stage in the weapons life cycle would seem to offer a more clear-cut choice or opportunity for qualitative constraint than the stage of arms transfer. The chief obstacles are not technical, military, or economic, but political (Refs. 11, pp. 21, 22, 219; 12, pp. 53-54).

Proposals for agreement among producers to limit arms distribution to their own or allied armed forces may reasonably be drawn up without seriously adverse implications for the economy or the security of either superpower, the PRC, or those other, secondary powers who together constitute the world's main suppliers. Provision could be made for one stage of transfer to treaty-allies and possibly even for replacement of like items to former customers. In all cases,

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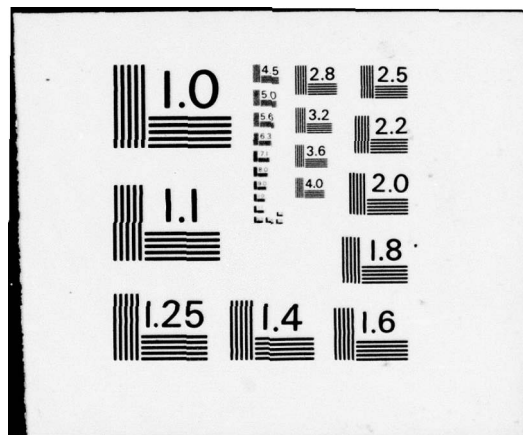
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further transfer should be prohibited and control of final disposal (scrapping) should be established between supplier and consumer, with cut-off of future supply as the sanction against violations. Smaller producers within the Third World could be induced by their own interests to give serious consideration to joining a constraint among the major suppliers. The present volume of distribution has gone so far as to suggest that a saturation level in terms of credible security needs has been reached in some parts of the Third World, exceeded in other parts of it, and cannot be far off in the remainder. Countries within the Third World having such size, position, and resources as to imply extensive security requirements and sophisticated armament needs are likely, in any case sooner or later to become producers themselves.

Control of transfers by the principal producers could, no doubt, never be absolute but would greatly diminish and dampen the traffic and is believed feasible, given a favorable political environment. Diplomatic recourse and economic sanctions may be taken by the agreeing states against maverick producers remaining outside the agreement. In an aggravated case of one or more such producers moving in to monopolize the market, the agreeing states might find it necessary to react by coordinated pressures including economic and security guarantees to potential recipients or their neighbors or even by recapture of the arms market through planned, subsidized resumption of transfers themselves until the maverick producer is constrained or driven off.

Development of a favorable political environment would require a searching examination by participants of their national policies and objectives, along with intensive negotiations in which the extension of influence by arms transfers—including sales, grants, and training—would be rejected as an instrument of international action. If, for example, the Soviet Union does proceed primarily from conviction that the communist ideology must some day form the basis of mankind's political and social organization, and, therefore, that communist movements must be supported wherever they declare themselves, the producers' control proposal is probably infeasible. On the other hand, the Soviet Union has more immediate major security interests that are unlikely to be adversely affected by negotiated constraints on arms distribution to the Third World. In fact, the Soviets probably proceed by pragmatic means within an overall field of ideological commitment, the intensity of which both in general and in particular situations has been inadequately understood by us. How compulsive or dominant their ideological basis is might be developed through skillful negotiation. What would be required, in short, are negotiations to end the prosecution of the Cold War and related contests, offensively and

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defensively, by surrogate clients (conflict by proxy) in the Third World, and to promote conflict-resolving conditions. This process should include the cut-off or reduction of the outward flow of arms from producers and the provision of encouragement and incentives for individual adherence by all producers to this undertaking. In effect, this form of control would imply a formal or informal world organization of arms producers, analogous in some respects to OPEC. (Ref. 13, pp. 47-49; Refs. 14-16).

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Chapter 6

TYPES OF AGREEMENT

GENERAL

In the preceding chapter, "Forms of Control," the desirability and feasibility of conventional arms constraints were addressed at the successive stages of weapons acquisition and distribution, from the allocation of resources to transfers. The purpose of this chapter is to examine possible types of control agreements in terms of general considerations and to examine several illustrative agreements that might be candidates for consideration in the contexts of the principal qualitative competitions previously discussed. (See Chapter 3 and the Appendices.)

By "agreement" is meant a negotiated undertaking accepted and legally ratified by two or more national states. The forum for the conduct of the negotiations may or may not be the United Nations. Post-World War I and II experience shows that the more successful arms control measures have been ad hoc agreements developed outside the world body (League of Nations or United Nations).

CONSIDERATIONS AFFECTING TYPES OF AGREEMENT

The type of agreement is determined by five general considerations, or factors. Each of these has a number of variations, or options, making possible — at least, theoretically — a wide variety of combinations. The selected combination of options defines the agreement and provides its structural framework.

Objective

The objective of an agreement in the context of this study expresses the agreement's desirability and utility in relation to qualitative arms conditions. That is, the basic objective of an agreement will be to reduce one or more of the following by means of negotiated controls on the acquisition or distribution of particular conventional weapons: the likelihood or destructiveness of war, the costs of preparing for war, the costs of preparing for war, or political tensions.

Participation

An agreement may be bilateral, between two countries or alliances, or multilateral, involving three or more. Participation may be defined primarily by geography, as in a regional agreement, or may be open to subscription by all states on a global basis. In functional terms, the agreement may be devised among arms producer states, or among consumers.

These subcategories of participation will necessarily overlap to some extent. That is, an understanding between the United States and the Soviet Union to limit in some manner their shipments of high performance aircraft to the Middle East would constitute a bilateral producers' agreement. The Declaration of Ayacucho (see App. C) was a multilateral, sub-regional, consumers declaration in anticipation of agreement.

Effectiveness in attaining the agreement's objective will depend on pertinent participation by specific states in terms of their capabilities and the selected form of general participation. An agreement, for instance, between Chile and Peru not to build and field antiballistic missiles might have some usefulness in limiting tension and demonstrating positive attitudes towards arms control, but neither state has nor is likely soon to develop this weapons capability. Such an agreement would have present utility only between high technology, nuclear states. The hypothetical agreement postulated in the preceding paragraph to control conventional arms transfers to the Middle East would have only limited utility until participation could be expanded to include other major arms producer/exporters such as Great Britain, France, and Italy.

#### Form of Control

Negotiations for an agreement will necessarily include consideration and determination as to which stage or stages of the weapon acquisition progression are to be controlled: RDT&E, production, procurement and distribution, use, or transfer (see Ch. 5). A combination approach may be feasible: for example, one that limits procurement (in amount), that limits distribution (possibly by geographical area), and that limits or precludes transfer (exports).

#### Degree of Constraint

Closely related to the form or forms of control adopted in the agreement will be the essentially quantitative matter of degree of constraint including time limits, and expressed as one of the following:

1. A ban, or prohibition, at one of the weapons stages. The only complete prohibition presently in effect is the Biological Weapons Convention of 10 April 1972. Theoretically, a ban may be applied at any stage, its desirability and feasibility being governed by particular circumstances. An area exclusion is a special case of prohibition.
2. A ceiling on the quantity of weapons to be produced, procured, deployed or transferred -- either globally or to particular areas.
3. A scheduled stretch-out in production or procurement and distribution to slow down the rate of deployment.

4. A reduction in the inventories of agreed weapons by scrapping, or attrition and non-replacement, or reduction of numbers in a specified area.

#### Implementation

Whether implicit or explicit, any agreement depends heavily for its implementation and continuing feasibility on the consideration of verification. The Sinai 2d Stage Disengagement Accord of 1 September 1975 provides a highly unusual example in which the parties — Egypt and Israel — agreed to observation of part of the disengagement line by a third party, the United States, and to verification of compliance with all terms of the agreement by a fourth, the United Nations. The history of both post-World War I and post-World War II attempts shows that proposals for inspection exchanges or for inspection or enforcement of arms controls by international bodies have been fruitless. The verification of compliance with an agreement depends on exchange of information between the parties and on their unilateral means of intelligence collection and analysis.

Even though a control proposal may be desirable, it may nevertheless be infeasible if verification is precluded by insufficient distinguishability and detectability of the arms subjected to control. Verification of some kind is, first of all, necessary to provide assurances of compliance; also, it must be continuous, and should be timely enough to provide early detection of violations and permit countermeasures to be taken before the situation becomes destabilized. Against the violator, various political, economic, and military sanctions — some highly dangerous — may be taken by the offended party or parties. On balance, probably the best single course is that of abrogation of the agreement and resumption of the arms competition.

#### ILLUSTRATIVE CANDIDATE AGREEMENTS

##### Agreement Among High-Technology States to Ban Production of Advanced Vehicular Armor

###### Main Elements.

Objective: To reduce military costs and prevent military destabilization by a constraint on advanced vehicular armor.

Participation: Principal participants would be, at a minimum, the US, the FRG, and the USSR. The agreement would be worldwide in potential application, although in practice it could focus initially on the NATO/Warsaw Pact confrontation. If politically feasible, it would be desirable to negotiate such an agreement on an alliance basis between

NATO and the Warsaw Pact. At least, it would be highly desirable to include the UK, France, and Czechoslovakia in the agreement at its earliest stages. However, since the US, FRG, and USSR are the nations with the largest armor forces deployed in Central Europe as well as the states most capable of developing advanced armor, inclusion of all three of them is absolutely essential to the candidate agreement.

Form of Control: On production of improved armor, and on the transfer of plans, designs, and technicians for production.

Degree of Constraint: Complete ban on production only, to last for a fixed period (e.g., five or ten years) with provision for extension. R&D on advanced armor as well as on antitank weapons options would be unrestricted under the agreement.

Implementation: Assurance of compliance may pose serious problems. Positive verification might require periodic (perhaps quarterly) adversary inspections at armored vehicle production facilities since utilization of advanced armor in a new tank design might not be obvious or detectable at a distance. On the other hand, conversions of existing tanks or production of new designs with advanced armor would not be dangerous until large numbers were introduced. It is highly unlikely that a significant percentage of the large tank inventory could be replaced without detection by general intelligence collection processes; thus general intelligence (that is, the whole spectrum of unilateral intelligence means) would be relied upon to provide the basis for adversary inspection. Adversary inspection could be confined to vehicle hulls as they come off the production line, while national means of verification would consider all evidence, especially in the issue and deployment stages.

#### Discussion

Tanks and other armored vehicles are a critical element in the balance in Central Europe. The Warsaw Pact has invested heavily in tanks with a present inventory that exceeds 20,000 and outnumbers NATO's inventory by three or four to one. To offset this quantitative superiority, NATO has given great emphasis to development of a new qualitatively superior main tank and to proliferation of antitank weapon systems. The latter includes two principal types: high velocity guns whose disabling effect lies in their kinetic energy and antitank guided missiles (ATGMs), which employ high-explosive antitank (HEAT), shaped-charge warheads. US forces have emphasized the latter, which are lighter, portable by dismounted infantry, have high accuracy, and are relatively cheap on a unit basis. FRG forces have emphasized high velocity guns, which are less suppressible by artillery and are capable of concentrated fire in tank/antitank duels. The USSR employs a mix of high velocity guns and ATGMs in rough balance with NATO's combined inventory of guns and ATGMs.

Advanced armor holds promise of significantly reducing the vulnerability of tanks and other armored vehicles to current anti-tank weapons systems — especially the present generation of ATGMs with HEAT warheads. Introduction of advanced armor, therefore, by one side would apparently result in a change in the tank/antitank equation and likely result in efforts by the other side to upgrade its antitank weapons, perhaps shifting more to high velocity guns with greater kinetic energy. Both sides, thus, would appear to have high military incentives — subject only to resource limitations — to develop and adopt the new, advanced armor and — correspondingly — to improve their antitank weapon systems capabilities to penetrate such armor. A real — but perhaps quite transitory — advantage would seem to accrue to the side that deployed armored vehicles embodying the new armor first. The advantage might be quite transitory because neither side would wish to be very far behind the other in adopting improved armor or offsetting improvement in antitank systems. This appears to be an area where something like a qualitative arms race may in fact exist in the conventional area, but where in the long-term no net change in the military balance will result if both sides pursue the race. If a verifiable constraint on such developments were feasible, both sides may have high economic incentives to avoid the costs of reequipping both their tank and antitank inventories and of enduring the potential uncertainties about stability in the transitional years until the new inventories are procured and deployed.

#### Net Assessment

Soviet incentives to accede to such an agreement would depend heavily on their long-range planning with respect to the next generation of tanks to follow the T-72 into the inventory and on their assessment of the capabilities of their current mix of antitank weapons against the new armor. Since the new armor would, if adopted by the US and NATO, improve the tank exchange rate for duels in US/NATO favor, the Soviets would have incentives either to adopt the new armor themselves (highly costly, especially in view of the recent acquisition of the T-72) or to delay or prevent adoption by US/NATO to avert the costs of pursuing the former course. Cost-saving incentives with respect to the antitank mix may not be so high since the Soviets do not rely so heavily on ATGMs — the component most significantly affected by the advanced armor. Soviet interest in such an agreement would also be circumscribed by their assessment of the PRC threat.

Despite the immediate incentives to the US to improve the protection of its new generation of armored vehicles against a numerically superior force, the US might have relatively high economic incentives to avert a later requirement to modify its antitank weapon mix that would result from Soviet adoption of advanced armor. Since the US antitank weapons mix depends heavily on ATGMs, the cost of upgrading this mix to deal effectively with advanced armor might be quite high.

The FRG would appear to have the least incentive to accede to the agreement. Its tank force is small in comparison to the USSR's and, like the US, in need of replacement with a new generation of tanks. Moreover, unlike the US, its antitank weapons mix relies more heavily on high velocity guns — the component which is more easily upgraded to improve its effectiveness against advanced armor if it is adopted by Soviet/Pact forces.

On balance, constraint on the development and adoption of advanced armor might be desirable to all parties. Economic incentives are relatively high to avoid developments that could produce temporary uncertainties in the military equation with little promise of long-term advantage to either side. Verification of compliance with the agreement — especially if adversary inspection is essential to assurance — would pose a difficult problem. However, if such difficulties could be overcome, the agreement might have exemplary as well as economic value as a case of superpower restraint.

#### Producers/Suppliers Agreement to Control Conventional Arms Transfers to the Middle East

##### Main Elements

Objective: To reduce political tensions in the Middle East and the likelihood of war between one or more of the Arab states and Israel by constraining the quality and quantity of destabilizing arms supplied to Middle Eastern countries.

Participation: Open to all states that are suppliers of arms to the countries of the Middle East. At minimum, the US, USSR, UK, France, FRG, Italy, and Czechoslovakia would be initial subscribers. The Middle East countries whose supplies would be affected would include Israel and all the states of the Arab League. Inclusion of North African Arab states and others not contiguous to Israel is required by the ease with which intra-Arab League transfers can be, and in the recent past have been, effected.

Iran need not be included among the affected states for several reasons: it is not directly involved in the Arab-Israeli conflict; its arms holdings (including present orders) in quantity and quality not only exceed those of its neighbors by far but exceed its own capabilities to use them, and may already have reached a saturation point; and it has no current, active disputes that threaten war. A tacit understanding should be sought with Iran to preclude that country's becoming a source of transfers to the affected states. Should it become so, the participants must determine whether to invite Iran to become a participant or, on the other hand, to include it among the affected states.

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Form of Control: On transfers, by sale or grant to the affected states of specific arms regarded as destabilizing. It cannot be assumed that a clear-cut, invariable distinction exists between destabilizing ("offensive") and stabilizing ("defensive") weapons apart from the operational intentions of their holders. For the purposes of this control, however, the following categories may be employed.

Destabilizing

High-performance aircraft --  
i.e., long range fighter  
bombers.

Surface-to-surface missiles.

Armor -- i.e., main battle  
tanks.

Aircraft carriers and sub-  
marines.

Stabilizing

Air defense weapons -- missiles  
and guns.\*

Antitank weapons (other than  
tank-mounted).

Mines.

Degree of Constraint: A uniform ceiling of indefinite duration at the highest level of any of the present operational holdings of Israel, Egypt, and Syria in the categories of destabilizing armaments. One-for-one replacements with the same models would be permitted as required by wear-out and accidents, but replaced equipment would be destroyed or cannibalized for spare parts. Other spare parts would be provided for operational maintenance. Accompanying measures in the multi-faceted approach of this constraint should include:

1. Provision of stabilizing arms having the capability to counter destabilizing weapons in the region.
2. Producer/supplier collaboration to shut down or diminish insofar as possible other commercial arms traffic in the region.
3. Simultaneous political and economic efforts to reduce area tensions, attain a general Arab-Israeli settlement, and promote peaceful economic progress.

Implementation: Verification by unilateral means and exchange of information between the participating producer/suppliers. Recourse against violators or suppliers outside the agreement would lie principally in resumption of the status quo ante and in various economic pressures that could be exerted on the violating supplier.

\*As noted previously, these can be destabilizing in some circumstances.

Discussion

A study of the Arab-Israeli problem since its origin in the World War I period and a review of the recent history of arms acquisition in the area, as shown in Appendix B, confirms the desirability of promoting stability in the area by arms constraints. What has been outlined is, in effect, an arms producer/supplier consortium. Both the Israelis and Arabs are likely to denounce the constraints of the consortium as imperialist oppression, but this complaint would at least give them an element of commonality. Because of the political polarization of the Arab-Israeli issue, wars in this area have posed serious dangers of superpower confrontation and world war. A common stand by the US and USSR would indicate that the superpowers themselves had at last depolarized the conflict, serving notice on both Arabs and Israelis alike that the great powers would not be drawn into war on this issue and that they — the Arabs and Israelis — might as well get used to it.

The Middle East is not vital to the interests of either the US or USSR except if it should become dominated by either one. Middle East oil, however, is critical to the Western European states. An Arab oil embargo in retaliation for weapons supply constraints could be met by united consortium action that might include lifting of the constraint from Israel, and alternative sources of oil. The most quickly available alternative source is Iran, deliberately left out of the agreement; and the prospect of Iran's garnering the vast additional revenues that otherwise would have gone into Arab coffers should deter an Arab oil embargo.

Economically and politically, the loss of profits from arms sales might reduce the desirability of the constraint, especially for the UK and France. Not all sales would be precluded, however, and the costs of grant aid of destabilizing weapons would be sharply reduced.

Difficulty might be encountered in agreeing which weapons are principally defensive and thus stabilizing and which are destabilizing. Defensive weapons would be considered destabilizing if they appeared to tempt Egypt or Syria to draw Israel into a low-level war of attrition to impose casualties on Israel that it could not long endure with its small population. The possibility of an Israeli assault similar to the 1967 war or even the exercise of any nuclear option it might have could then arise. However, a strategy of attrition like that engaged in by Egypt in 1969-70 is less feasible now, following the disengagement agreements of 1975 and the interposition of UN forces in both the Sinai and the Syrian Golan heights. The presence of US technicians in the Sinai further complicates such a strategy. Failure by any party to renew the UN presence or to continue the US presence would be a warning signal and, presumably, provide some time for great power intervention to forestall a war of attrition or to attempt to arrange a ceasefire should one occur.

It may be argued that the qualitative weapons level has already been raised so high in the Middle East as to make qualitative constraint futile. Israel is capable of producing its own high-performance aircraft and surface-to-surface missiles, and Egypt is actively pursuing a like capability. However, the proposed producer/supplier constraints could at least promote stability by ensuring qualitative parity in long range arms and by encouraging air and antitank defenses. Indirectly, any resulting reduction of tensions should also contribute to a slow-down in indigenous development and production. As part of the whole plan, the consortium ought to make its own estimates of reasonable security needs in the Middle East, rather than cursorily accept the proposals of the indigenous states themselves.

#### Net Assessment

There is nothing technically infeasible about such a qualitative constraint. It has sufficient latitude to be capable of refinement by further study, and is recommended for further consideration. Politically, both superpowers would have to forego any efforts to establish hegemony and greatly reduce their competition for influence and power in the area. Economically, the loss of arms sales profits must be compensated for by other forms of aid and trade agreements between the producer/suppliers and the affected states. While such obstacles are high, if they can be surmounted, the potential payoff from such a qualitative constraint is also very high. Not only could the states of the Middle East benefit, but the cooperation between the US and the USSR in such a constraint could be as significant as SALT in reducing tensions and the dangers of war between them.

#### Consumers Agreement to Control Procurement of Sophisticated Conventional Arms in Latin America

##### Main Elements

Objective: To reduce political tensions and prevent military destabilization and large increases in military costs by constraints on arms importation.

Participation: Open to all states of Latin America. Initial participants would include at least the states that signed the Ayacucho Declaration of December 1974 — namely, Argentina, Bolivia, Chile, Colombia, Ecuador, Panama, Peru, and Venezuela. In addition, participation by Brazil would be almost essential and would be urgently sought.

Form of control: On procurement of high-technology, destabilizing armaments, the Ayacucho Declaration pledged the parties not to secure "offensive weapons of a sophisticated nature," but did not specify them. The difficulty, historically predictable, of finding consensus on a categorical delineation of offensive weapons led to reports in early

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1975 that all participants except Argentina and Panama had pragmatically decided to include the word "defensive" in their interpretation of the declaration.

Degree of constraint: A ban of continuing but unspecified duration to be reviewed annually, on the acquisition of destabilizing arms qualitatively superior to the most advanced types now held, and on further acquisition of those types in numbers exceeding present inventories by more than ten percent. In effect, the agreement would establish a status quo qualitative and quantitative ceiling, subject to frequent review and reconfirmation or agreed modification.

Implementation: This study has discussed elsewhere the difficulty in making categorical distinction between offensive and defensive systems. It also has suggested, however, that useful, if less-than-absolute, guidance derives from the apparent tendency of certain armaments to be destabilizing, while others tend to be stabilizing. This candidate agreement does not require coping in depth with the old conundrum of offensive/defensive weapons. Considering the present arms holdings of the participants and of Brazil, the interests of stabilization would be served by placing a ceiling on quantities of weapons in the following categories and limiting their qualitative characteristics to the maximum ones shown:

<u>Category</u>	<u>Maximum Characteristics</u>
High-performance aircraft	F5E Tiger II
Surface-to-surface missiles	Range: 100 km
Tanks	AMX-30, T-55, & M-48
Submarines	Oberon, S-55 & Type 209, S-32

Verification would be principally by unilateral means supplemented by exchange of information among participants. Enforcement could be strengthened by adding codicils for supplier states to respect the agreement and for participating states to refrain from production as well as importation.

### Discussion

In contrast to the Middle East, Latin America appears to be a region in which the preconditions for negotiation are relatively well satisfied. In the two and a half decades since 1950, Latin America accounted for less than ten percent of the world's major arms imports. In the same period, the Middle East took about 35 percent of all imported arms. The comparative values of imports from 1963 through 1973 among the

Latin American "big six" of Argentina, Brazil, Chile, Colombia, Peru, and Venezuela are detailed in Appendix C, Table 5.

The principal security concerns in the past decade have been internal security matters rather than international. Cuba, although armed by and dependent upon the Soviet Union, has been isolated in its island bastion and has not posed a serious threat except as a clandestine instigator of internal insurgencies. Nuclear weapons were prohibited in Latin America by the Treaty of Tlatelolco. Among the leading six states there are no serious, active disputes in any way comparable to the Arab-Israeli, India-Pakistan, or Cyprus problems; however, political tensions, especially between Peru and Chile, had mounted prior to the Ayacucho Declaration and were one of its major stimulants. There is, among the Spanish-speaking nations, an old, generalized background fear that the Portuguese-speaking giant, Brazil, will endeavor to establish hegemony over the continent, but no overt evidence of such intent has been provided by Brazil's actions or recently claimed by other states.

Several factors indicate high desirability, feasibility, and timeliness for the candidate agreement. These include: the relatively low levels of existing arms competition and political tension; a rough state of balance among the military forces of the region that is apparently satisfactory or at least not seriously challenged; and, above all, the evident interest of the parties themselves in preventing a high-technology arms competition. The possibilities for mutual observation and exchange of information for verification are relatively good. Feasibility is further enhanced by the fact that none of the parties is a producer of the controlled arms. A violator would have to procure these arms abroad, and they are the type of arms held only in the custody of national states rather than commercial arms merchants. Producer/supplier states could transfer such arms to a violator — even using an intermediary country or agent — only by a breach of an official international agreement, thereby risking serious diplomatic or other repercussions from the offended participants in the agreement, from other supplier states, and from world opinion.

#### Net Assessment

The Ayacucho Declaration was an earnest of constraining qualitative arms competition that is unique in recent history. To build on this and encourage its fulfillment could limit political tensions in the area and avert costly burdens of further competition. The principal obstacles to agreement appear to be the reluctance of Brazil to support the Declaration, local tensions such as those between Chile and Peru, and rising competition by producer/supplier states for arms sales in the region. A careful effort to overcome these obstacles would appear to be in the US interest in fostering stable development in Latin America as well as in the national interest of the states of the region. On the other hand, the US could endanger indigenous interests in

constraint by appearing too anxious to see them come about or, even less, to impose them. The candidate agreement appears worthy of further consideration and encouragement.

US/USSR Agreement to Limit Conventional Naval Buildup in the Indian Ocean

Main Elements

Objective: To reduce political tensions in the Indian Ocean area, to reduce the likelihood of naval confrontation and inadvertent hostilities among naval forces deployed in or transiting the Indian Ocean, and to provide incentives for Indian Ocean states to exercise restraint in the buildup of their naval forces.

Participation: Initially a bilateral agreement between the US and the USSR but open to subscription by other states. Other principal states who should be urged to subscribe to naval limitations include the PRC, the UK, France, Japan, India, Pakistan, Australia, South Africa, Indonesia, and Iran.

Form of Control: A quantitative limitation on deployment (distribution) of designated naval armaments and forces of the superpowers and other major powers, perhaps supplemented by qualitative constraints on indigenous navies.

Degree of Constraint: The central element of this agreement would be ceilings of indefinite duration on quantities of naval armaments and forces of the US and USSR that would be permitted in the Indian Ocean at any one time.

Implementation: Different ceilings would be established for surface warships, naval air, and amphibious forces. Submarine forces would be exempted from control because of difficulties in verification. Within each category of naval forces, ceilings could be separately established for classes of vessels — i.e., within the category of surface warships, separate ceilings could be established for aircraft carriers, cruisers, destroyers, and destroyer escorts or frigates. Naval air should be limited by aircraft as well as by carrier, since the Soviet naval air is land-based. Low ceilings should be sought on amphibious forces vessels such as helicopter carriers and troop ships since these provide a capability to project power ashore. Other states with significant naval capability should be encouraged to subscribe to the agreement with lower ceilings reflecting their current capabilities. Littoral states (except those named above as participants) could probably be encouraged to accept qualitative limits on their navies, limiting them to coastal patrol and protection especially if the ceilings on amphibious forces of the major and superpowers were set low enough.

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Ceilings should be set high enough to provide for some more-or-less permanent stationing of naval forces in the Ocean plus normal transiting requirements. In addition, some allowance could be made for modest surges of deployed forces in "show-the-flag" or "show-of-force" roles in crisis management. On the other hand, ceilings should be set low enough to constitute a real constraint.

No enforcement means other than the threat of abrogation by the offended party or parties are considered feasible. In effect, the agreement would be comparable to SALT at a conventional (or dual-capable) level and confined to a specified region.

If submarine forces were exempted from control as suggested above, verification of compliance could probably be satisfied by national intelligence means. The major instrument of verification would be surveillance, conducted by ships, aircraft, and possibly satellites. The existence of only a limited number of access routes into and out of the Indian Ocean further enhances verification. In fact, the US might have an advantage, as monitoring means based in Australia, Thailand, Ethiopia and South Africa as well as Diego Garcia could maintain surveillance over the major sea routes. The necessity of verification might require a small number of US and Soviet military support facilities limited to surveillance capabilities. This in turn might cause objections by some of the littoral states, yet neither the US nor USSR is likely to agree to third party verification alone. Supplemental verification might be provided on an informal basis, through surveillance and observation by Indian Ocean littoral states and/or by other external powers who maintain a naval or merchant ship presence in the region, but such means could not be a substitute for unilateral verification.

### Discussion

The agreement outlined would be a qualitative constraint only in an indirect way. A significant buildup in the Indian Ocean of conventional naval forces of the US, the USSR, and other seagoing powers of the Western world could only provide long-range incentives for developing powers such as India, the PRC, and Pakistan to improve both the quality and the quantity of their naval forces. On the other hand, "demilitarizing" the Indian Ocean by placing fairly severe ceilings on the forces of the principal external powers could be used as pressure to keep even the navies of the major littoral states primarily coastal and self-defense forces.

An agreement placing low limits on US/Soviet naval deployments to the Indian Ocean should also reduce the likelihood of an accidental, uncontrolled clash of forces in the Indian Ocean, and in the event of a future regional crisis, similar to the 1971 India-Pakistan War, a balanced, minimal, neutral US/Soviet presence could help to limit the conflict by defining the superpower position from the outset. Neither

could introduce major forces into the area without violating the agreement and coming into immediate confrontation with the other in a situation of possible global war. This prospect should make intervention in regional wars highly unattractive. The agreement and the procedures worked out to implement it would likely have utility for improving superpower crisis management.

No major interests of either the US or the USSR would appear to be threatened by the candidate agreement. By affording both sides at least an austere force able to serve as the nucleus of a capability to protect sea LOCs, to demonstrate resolve at a very early stage, and to perfect operational planning and intelligence functions in advance, the agreement might improve the changes of superpower balancing being kept at a relatively low level. The apprehension of Western Europe and Japan regarding the security of international sea LOCs and the freeflow of Mid-East oil may also be slightly eased by the existence and observance of a naval limitations agreement. US alliance connections with CENTO and SEATO could pose some problems for US freedom to accept such a limitation, but these would have to be weighed against the advantages of averting a large Soviet buildup in the Indian Ocean.

#### Net Assessment

Overall, an agreement on US/USSR naval deployment permitting austere task forces limited in capability to conducting essential missions but on a low scale appears to warrant serious consideration. It offers no major economic savings, but poses little in the way of risk, provided that the agreement maintains a balance of forces and capabilities. And it may provide some stability to the region as well as limiting US/Soviet tensions. Major problems to be overcome include persuading the US/USSR it is in their interest to negotiate, accounting for the transit of warships, and determining what impact the presence of other naval forces in the region--particularly the UK, France, India, and Australia--would have on US/Soviet negotiations.

## Chapter 7

## CONCLUSIONS

## GENERAL

Arms control is a central element in the security policy of the United States. As noted in Chapter 4, the objectives of reducing the likelihood of war, of reducing the destructiveness of war should it occur, of reducing the cost of preparing for war, and of reducing political tensions are objectives that are common to arms control and defense policies. Achievement of any or all of these objectives depends not only on the harmonization of US arms control and defense policies — with consummate skill in diplomacy and timing — but also on the circumstances prevailing in the world far beyond US borders. Whether US policy should emphasize military buildup and strength in association with friends and allies to achieve, for example, the first two objectives subject at least to constraints associated with the latter, or whether the US may better ensure even these two and, perhaps more probably, the latter two by arms control policies is tightly circumscribed by prevailing world circumstances. In this context, this study has surveyed some of the salient features of those circumstances to assess the desirability and feasibility of seeking qualitative constraints on conventional armaments through arms control policy and negotiations.

## ARMS CONTROL OBJECTIVES AND US NATIONAL INTERESTS

That — other things being equal — it is less costly in scarce resources and more consistent with a general US disposition in the world to seek security objectives through constraint, control, diplomacy, and negotiation is perhaps self-evident. There are, to be sure, forces in US society that — despairing of these as independent variables — would seek a predominating US quantitative and qualitative military superiority as the necessary pre-condition for constraint, control, diplomacy, or negotiation in the world. They might also see other US interests — such as access to raw materials and markets for US products — as ensurable only through military strength and not mutual constraint. Finally, they might welcome competitions for military strength between other parties as providing opportunities for US leverage in military and political balancing roles. Such forces would almost always militate against seeking security through arms control.

The US public consensus — reflected in the policies of all the post-World War II administrations — appears to support an openness to, if not an active pursuit of, arms control as one of the principal means to national security. In this consensus, arms control measures — if

the circumstances are right — are consistent with basic national security objectives that are also pursued, complementarily, by military policies. The fundamental problem for US policy is determining when the circumstances are right — or, conversely, how much opportunity the US has for influencing the circumstances — for effective and verifiable arms control.

Examining primarily qualitative aspects of conventional armaments and the impetus that modern technology and industry as well as inter-state political competition and conflict give to qualitative improvements in conventional armaments, this study concludes that present circumstances and the opportunities for influencing them afford few, rather limited prospects for hopeful pursuit of qualitative constraints on conventional armaments. Desirable in the abstract as that objective may be primarily from the point of view of slowing the arms race and conserving or diverting resources — including technological capabilities for social, economic, and humanitarian pursuits rather than military ones — close examination of particular arms competitions yields substantial evidence that desires for technological and quantitative improvement in their conventional armaments among principal protagonists will predominate over desires to constrain qualitative competition. The US will continue to see a technological lead as an important ingredient of its balance of forces with the USSR. Other NATO allies will also see extra-NATO values to qualitative improvements in conventional armaments to the extent that these play a role in competitions for the extra-NATO markets that some of their key industries are dependent on. The USSR and its Pact allies will want to close a technological lead or even reverse it to maintain the advantage of quantitative superiority in conventional forces in being.

Outside the central US-USSR/NATO-Pact competition, the industrialized powers that are responsible for most qualitative improvements in available armaments might appear to have greater incentives for restraint or agreed constraint in the qualitative aspects of the arms that are transferred by aid or by sales. Self-restraint or agreed constraint, however, are weakened by both the political and economic utility to suppliers of arms transfers and the desires and the ability in the case of recipient states to acquire the best available armaments. In comparison to the UK and France, the US uses arms supply for political purposes more than for economic ones and, therefore, presumably would be more ready to accept agreed constraint if not self-restraint. Conversely, agreed constraint in supply of qualitatively improved armaments would be more of an economic hardship on the UK and France than on the US, whether to Latin America or to the Middle East.

In recent years the US has had less political or foreign policy incentive to supply arms to Latin American states than to Middle Eastern states where political tensions and dangers of polarization have run much higher. Indeed, for the sake of inter-American relations, the US

has had incentives to minimize its supply of arms to Latin America to a level consistent only with avoiding non-American domination of arms transfers to Latin America. Since there are signs that the Latin American states themselves may desire agreed constraint, this may be one of the more hopeful areas for qualitative constraint. However, it is unlikely that qualitative constraint would succeed if it appeared to be imposed from outside the area. US policy toward such a development should probably, therefore, be one of "benign support" rather than active pursuit.

In sum, qualitative constraints on conventional armaments vis a vis US national interests are abstractly desirable at least from a resource conserving point of view in competitions in which the US is directly involved, but ambiguous because of a US interest in maintaining a technological lead. In such competition the final judgment on desirability of any particular constraint would depend on showing not only that it is feasible to implement with assurance of compliance, but that the technological lead involved may be perishable anyhow. Qualitative constraints in competitions in which the US is not a principal contestant would be abstractly desirable principally for reasons of reducing the buildup of political tension and the dangers of war and, perhaps, somewhat less ambiguous from the point of view of other (i.e., economic and foreign policy) US interests if they also can be shown to be feasible to implement with assurance of compliance.

#### SPECIFIC CONCLUSIONS

1. The record of past attempts to negotiate qualitative constraints on conventional armaments is characterized by mostly futile efforts to achieve or preserve a perceived military advantage, to distinguish offensive and defensive weapon systems, to calculate mutually acceptable force or weapon equivalences, and to invoke the goal of general and complete disarmament as a moral alternative to war. Nonetheless, negotiations have succeeded in a few cases in constraining potential developments that were broadly perceived to be especially destructive or destabilizing.

2. Qualitative improvements in conventional armaments are competitively sought by modern states for strong military, political, economic, and technological reasons. States are willing to commit substantial resources and endure significant opportunity costs in order better to ensure their security through competition that has become qualitative as well as quantitative in almost all areas of the world.

3. Qualitative competition in conventional armaments between high-technology, industrialized, nuclear-armed states — notably the United States and the Soviet Union — is likely to be macrocosmically stabiliz-

ing, but may, in fact, be microcosmically destabilizing, entailing high costs. Comparatively, however, qualitative conventional competitions are likely to be macrocosmically destabilizing in lesser-developed regions, notably the Middle East.

4. As a precondition for negotiation and implementation of a control agreement, there must exist among the parties some minimum degree of mutual or common recognition that the constraint is more desirable than the unconstrained competition that might ensue in the absence of agreement. An agreement, in general, is likely to be successful only if the parties perceive a condition of approximate military balance, and, finding the status quo to be relatively acceptable, aim to avert potential future imbalances more than to adjust current imbalances.

5. The desirability of particular qualitative constraints is a function of interrelated and variable military, political, economic, and technological factors, none of which is necessarily dominant in every situation. Considering such factors in particular circumstances, the desirability of constraints may be evaluated in terms of objectives to accomplish one or more of the following:

- a. To reduce the likelihood of war;
- b. To reduce the destructiveness of war if it occurs;
- c. To reduce the costs of preparing for war; and
- d. To reduce political tensions.

These categories of arms control policy objectives are not inconsistent with most aspects of military policy objectives. They may, however, be competitive among themselves; for example, higher costs might have to be accepted in an agreement to reduce political tensions should the latter objective be assessed as more urgent and desirable.

6. The feasibility of implementing a qualitative constraint will be largely a function of how well the activity or process of qualitative improvement or the end-product item or system can be distinguished and its control be subject to timely verification of compliance with the agreement. Since international or third-party inspection and enforcement means can generally not be regarded as reliable for states where their national security may be at stake, feasibility will depend largely on whether compliance with the agreement or detection of violations can be verified by unilateral national means and whether adequate and timely responses to violation are available to complying states.

7. Although the growth in arms technology would appear to offer in theory a wide range of opportunities for qualitative constraints, in practice, the field is circumscribed by both desirability and feasibility analyses. The least feasible forms of control are those over research and military budgets. For truly major improvements or weapon "breakthroughs," the early test stage is the first point in development where it is feasible to apply constraint. For other conventional armament improvements, the later stages of production, distribution, and transfer offer better opportunities. The high pace of quantitative and qualitative arms acquisition in the Middle East in particular suggests controls on the transfers of sophisticated arms to that region.

8. The following candidate agreements discussed in Chapter 6 and supported by the appendices to this study, are offered and recommended for further consideration and analysis:

a. An agreement among high-technology states to ban production of advanced vehicular armor; objective: to reduce military costs and prevent military destabilization.

b. A producers/suppliers agreement to control conventional arms transfers to the Middle East; objective: to reduce political tensions and the likelihood of war in the area between Israel and one or more of the Arab states by constraining the input of destabilizing arms.

c. A consumers agreement to control procurement of sophisticated conventional arms in Latin America; objective: to reduce political tensions and prevent both military destabilization and cost increases through constraints on imports.

d. An expandable but initially bilateral agreement between the US and USSR to limit conventional naval strengths in the Indian Ocean; objective: to reduce the likelihood of naval confrontation and inadvertent hostilities between naval forces deployed in or transiting the Indian Ocean, to reduce political tensions in the area, and to provide incentives for Indian Ocean states to exercise restraint in naval acquisitions.

9. On balance, it appears that selected qualitative constraints on conventional armaments could be both desirable and feasible in particular arms competitions. The principal criteria for selecting those qualitative improvements to be constrained are those that appear in the specific competitions to be destabilizing in either a macrocosmic or a microcosmic sense and for which a feasible form of control can be identified. Though limited in number, significant opportunities appear to exist for US initiatives in this neglected area of arms control.

Appendix A

CLASSIFICATION OF QUALITATIVE IMPROVEMENTS  
IN CONVENTIONAL ARMAMENTS

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Appendix A

CLASSIFICATION OF QUALITATIVE IMPROVEMENTS  
IN CONVENTIONAL ARMAMENTS

INTRODUCTION

The European arena of potential conflict exhibits the most costly and technologically intensive competition in the world today as each of the NATO and Warsaw Pact alliances attempts to achieve superiority in conventional war fighting capabilities. Nations outside this particular arena watch the competition with considerable interest and envy as weapons systems that are displaced by more advanced weapons become available to those lesser developed and developing nations who may enjoy (or endure) a client-type relationship with one of the superpowers or its allies.

The first part of this appendix presents a framework for classifying and examining qualitative improvements by force elements and by their contribution to force effectiveness. The second part is an assessment of some selected examples from the NATO/Warsaw Pact arms competition in terms of their impact, uniqueness, and detectability as qualitative improvements.

CLASSIFICATION

Force Design and Balance

The effectiveness of a modern military force is dependent on a number of fundamental achievements in technology, training, leadership, organization, and the allocation of capital resources. The vital interests of the country, the character of the perceived threats, and her geography determine the composition of the required military force. The problem of military force design is classically one of achieving a proper balance among the force components. The issue of the proper balance arises at a number of different levels of force aggregation. For instance, the balance among ground combat, air combat and naval warfare capabilities must be maintained. Similarly, the design of a ground combat force is a matter of balancing infantry, tank and artillery units in a combined arms team with adequate tactical air and combat support systems. Finally, a balance must be maintained in the mission mix that combat elements are able to support. The force must be balanced in the sense that it is possible to defend, to attack, to withdraw, to exploit and to fight effectively in meeting engagements. A qualitative improvement in armaments that would be of major concern to opposing forces can be defined as a weapon systems development that seriously disrupts the military balance in the enemy force structure.

The impact of qualitative improvement in armaments can also be described directly in terms of measures of weapon systems effectiveness. The three major categories of weapon systems effectiveness improvement that are defined below are: (1) weapon system lethality, (2) flexibility of employment, and (3) sustainability.

In order to discuss the impact of the qualitative improvements in armaments in an orderly fashion, it is also necessary to develop a detailed structure for the examination of the combat forces. The principal components of conventional combat forces are land combat forces, tactical air forces, and naval forces. A fourth category of national level assets, strategic mobility forces and logistics support capabilities will be examined separately.

Land combat forces are in turn divided into two major components: (1) the maneuver elements, and (2) combat support capabilities. The maneuver elements consist primarily of infantry and tank battalions. The combat support means include artillery, combat engineer support and attack helicopter squadrons.

Air warfare capabilities consist of counterair elements, deep strike capabilities, and combat fire support assets. Counterair elements consist primarily of fighter aircraft and air defense weapons. Deep strike systems consist primarily of fighter bombers and associated ordnance. The combat fire support assets consist primarily of close air support aircraft and associated ordnance.

The components of naval forces can conceptually be categorized into ocean control elements and amphibious assault forces. The ocean control category includes ocean surveillance, undersea surveillance, fleet offense, fleet air defense, and fleet antisubmarine warfare functions. The amphibious assault forces include the marine units, the naval support force, and the fleet firepower assets dedicated to the support of opposed landings.

#### Weapons Lethality, Flexibility, and Sustainability

The array of combat force categories and weapon systems effectiveness measures is presented in Table 1. Before proceeding with an examination of weapon systems developments that illustrate the qualitative improvements in armaments possible in each sub-element of the array, it is useful to define the concepts of weapon system lethality, flexibility of employment, and sustainability, in greater detail.

Weapon system lethality is in essence the ability to deliver destructive fire on a target. It consists of the range at which targets can be engaged, the accuracy and rate of fire and the terminal weapon effects

Table I  
CLASSIFICATION OF SELECTED QUALITATIVE IMPROVEMENTS IN ARMAMENTS

Force category	Force effectiveness measure		
	Weapon system lethality	Flexibility of employment	Sustainability
<u>Land Combat Forces</u>			
a. Maneuver elements	Direct fire weapons; guided missiles; ammunition	Tactical ground sensors; airmobility	Improved armor protection; pro- liferation of weapons
b. Combat support forces	Indirect fire weapons; attack helicopters; mines; precision guided munitions; improved conventional munitions	Airborne sensors; tactical command and control	Mobile weapon platforms with light armor pro- tection; extended range ordnance
<u>Air Combat Forces</u>			
a. Counterair	Advanced fighters; air- to-air missiles; advanced air defense systems	Airborne command and control; aircraft avionics	Mobile forward area air defense systems; man- portable air defense weapons
b. Deep strike	Variable geometry wing fighter bombers; guided air-to-surface missiles	Navigation/terrain avoidance radar; self- contained night attack capability; TOA/DME	Air defense suppression; strike RPV's
c. Combat air	Improved payload; advanced weapon delivery systems; guided air-to-ground ordnance	Laser designation; ground based radar bombing system	Standoff ordnance

Table 1 (continued)

Force category	Force effectiveness measure		
	Weapon system lethality	Flexibility of employment	Sustainability
<u>Naval combat forces</u>			
a. Ocean control	Surface-to-surface and air-to-surface antiship missiles; nuclear attack submarines; improved torpedoes; CVA/tactical air	Airborne early warning; SOSUS arrays; satellite surveillance	Fleet air defense; surface effects ships; nuclear submarines
b. Amphibious assault	Landing vehicle assault; attack helicopters; attack air	Fast deployment ships; helicopter carriers; ACV's	Surface effects ships; ACV's

that are achieved. Weapon systems which significantly improve the capability to achieve these elements of weapon system lethality represent qualitative improvements in armaments.

Weapon system lethality is in turn constrained by the ability to acquire and designate targets for engagement. The ability of a military force to designate targets for attack at night, during adverse weather conditions, against targets in concealed positions, and with greater responsiveness will increase the flexibility of employment of a force. Also, the ability to operate in difficult terrain and to rapidly gain access to key military terrain increases the flexibility of employment of a weapon system.

The sustainability of the military force is directly dependent on the vulnerability of weapons, the ability to proliferate weapon systems in a force, the battlefield mobility of the weapon systems and the ability to deny the enemy accurate targeting information. The use of unmanned devices to perform combat functions also would usually increase force sustainability in the sense that higher levels of attrition are acceptable for sustained combat operations.

The fourth combat force category of national level assets, strategic mobility forces and logistic support capabilities, cannot be analyzed directly in terms of the three measures of combat effectiveness described above and has not been included in Table 1 for that reason. National level assets include satellite surveillance, satellite communications, area navigation support systems, and command and control assets. Strategic mobility forces include strategic airlift and sealift capabilities and terminal cargo handling equipment. Logistics support capabilities include theater level mobility forces and engineer capabilities such as tactical POL pipelines and obstacle-crossing equipment. While weapon systems lethality does not apply directly to these defense-wide military assets, significant improvements in the flexibility of employment and force sustainability can be achieved as a result of improvements in these force categories.

#### Other Considerations

While qualitative improvements in armaments are examined above primarily in terms of the impact on the effectiveness of military forces, moral and political considerations can also form a basis for differentiating between evolutionary or significant changes in weapon systems capabilities. A moral issue is involved in considerations of weapon developments that have a potential for increasing the collateral damage to the civilian population. Long-range surface-to-surface missiles with large conventional warheads and bombers with increased payload and range capabilities, for instance, have a potential for increasing civilian casualties since the relevant weapon delivery accuracies and targeting capabilities are generally not adequate to restrict damage to military targets.

An interesting example of an improvement in weapon systems military effectiveness that also has the potential for reducing collateral damage to the civilian population is the air-delivered precision-guided weapon. Rather than requiring a hundred sorties to destroy a bridge in an urban area with the high probability of significant collateral damage, a few sorties would be required with precision-guided munitions with almost no risk of collateral damage.

A moral issue could also be considered to be involved in the particular emphasis that is given to various mission capabilities of a force. Conceptually, a weapon development that increases the capability of the defending force could be considered to be stabilizing while a weapon systems development that increased the effectiveness of an attacking force could be considered as destabilizing. The recent experience of the October 1973 War provides an interesting counter example of this view. The Arab states, by acquiring fundamentally defensive capabilities such as SA-6 air defense system and the Sagger antitank missiles as means for countering Israeli attack aircraft and tanks, felt able to renew hostilities. In effect, the introduction of qualitatively improved defensive weapons into the Arab states was destabilizing.

Political considerations can also be a basis for judging the significance of improvements in armaments. The government in power must be able to control the air space, the coastal waters, and the borders of the country in order to enjoy the confidence of the population. To the extent that neighboring states acquire a capability to violate national borders or air space with weapon systems that operate outside the performance boundary of the existing defensive weapons, such new weapon capabilities could be considered to be qualitative changes even though no direct large changes in the effectiveness of military forces result from the introduction of such weapons.

#### Land Combat Means

The principal focus of this study, however, is on qualitative improvements in armaments that can be measured directly in terms of combat capabilities. Summary descriptions of type improvements in weapon systems capabilities are provided in Table 1. These examples of type qualitative improvements in armaments are based on weapon systems developments by the two superpowers that are currently being deployed or are in the research and development phase. The regional contest for which the qualitative improvements in armaments are most directly applicable is the NATO/Warsaw Pact balance in Central Europe. A brief discussion of the basis for selecting the examples in such sub-element of Table 1 is provided below.

For the land combat forces sub-category of "maneuver elements," direct fire weapons, guided missiles and ammunition are identified in Table 1 as

the force effectiveness measure of weapon systems lethality. Qualitative improvements in direct fire weapons include advanced fire control systems for the tank main armament including an accurate shoot-on-the-move capability. Advanced infantry antiarmor guided missiles that can destroy moving tanks at extended ranges are another example of a qualitative improvement in armaments. The improved ammunition example refers to armor-piercing, discarding-sabot antitank rounds and rocket-assisted gun ammunition. Also, for the land combat forces sub-category of maneuver elements, tactical ground sensors and airmobility are identified as the force effectiveness measure of flexibility of employment. Tactical ground sensors include night vision devices, unmanned ground sensors, infrared imaging systems and ground based moving target indicator radar. The airmobility category refers to advanced troop lift helicopters and heavy lift cargo helicopters. The sustainability of the maneuver elements will be significantly enhanced by improved armor protection and the proliferation of major infantry weapons. The development of advanced armor for tanks will enhance their survivability. The proliferation of weapons examples refers to infantry antitank weapons that are issued on a unit rather than designated specialist basis.

For the land combat forces sub-category of "combat support forces," indirect fire weapons, attack helicopters and various types of advanced ordnance are identified in Table 1 under the force effectiveness measure of weapon system lethality. Qualitative improvements in fire support system lethality will result from increased mobility of fire and more effective ordnance. Greater mobility of fire can be achieved with increased artillery range or with the inherent speed of a fire support helicopter. The ability to concentrate a greater fraction of fire support assets at critical sectors of the front is the primary measure of fire support effectiveness. Advanced ordnance can provide a significantly larger mean area of effectiveness as with improved conventional munitions; a step improvement in the ability to destroy hard mobile targets as with precision-guided artillery rounds and helicopter-launched antitank guided munitions; or increased duration of fire support effectiveness as with artillery-deployed or aerial-delivered mines. Airborne sensors and advanced tactical command and control systems are identified within the category of combat support forces increased flexibility of employment. Airborne sensors will permit accurate identification and location of targets beyond line of sight from forward maneuver elements; and computer-aided fire control systems and aerial imagery terminals will permit attack of mobile targets. Increased sustainability of fire support forces can be achieved as a result of weapon mobility and light armor protection such as exhibited by self-propelled artillery systems. Increased stand-off capability either as a result of stand-off missiles for helicopters or rocket-assisted artillery rounds will also improve fire support system survivability since it is more difficult for the enemy to deliver effective counterfire.

Air Combat Means

For the air combat forces sub-category of "counterair," advanced fighters, air-to-air weapons, and advanced air defense systems are identified under the weapon effectiveness category of weapon system lethality. Advances in air-to-air combat effectiveness are dependent on improvements in aircraft performance and increased effectiveness of aerial ordnance. An air-to-air missile that can be effectively fired from all aspects at enemy aircraft or from significantly greater range can result in large improvements in air-to-air kill potential. Similarly, surface-to-air defense missiles that can engage high speed maneuvering targets from a frontal aspect will expand the defender's opportunities for successfully engaging enemy aircraft. Flexibility of employment of counterair systems can be improved by providing adequate warning and accurate designation of approaching enemy aircraft. Airborne radar platforms have a significant advantage over ground-base radar because of reduced terrain interference; and aircraft search and track radars that will permit acquisition and engagement of targets at greater ranges will permit more flexible employment of counterair assets. The sustainability of counterair forces can be significantly improved by denying the enemy up-to-date targeting information with weapon mobility or by proliferating targets beyond the ability of enemy aircraft to engage them, as would be possible with man-portable surface-to-air missiles.

For air combat forces sub-category of "deep strike systems," variable geometry wing fighter bombers and guided surface-to-air missiles are identified under the weapon effectiveness category of weapon system lethality. Variable geometry wing fighters are designed to operate efficiently at a variety of speeds, which permits increased penetration ranges, provides for locating and accurately attacking targets from low altitude, and enables carrying larger bomb loads. Air-to-surface guided missiles provide a large increase in the capability of aircraft to destroy small hard targets. Flexibility of employment of deep strike systems is significantly improved by the ability to navigate to targets and to locate targets under reduced visibility conditions. The ability of an aircraft to locate and to attack mobile targets permits effective interdiction operations in enemy rear areas. The ability to locate and attack radiating targets without ever establishing line of sight to the target also improves the flexibility of deep strike operations. Deep strike aircraft survivability is necessary for sustained operations. The ability to suppress enemy air defense systems by electronic devices or attacks against the air defense network can significantly enhance the sustainability of a deep strike capability. The sortie loss rate that is acceptable for sustained operations can be fundamentally altered by employing remotely piloted vehicles for deep strike operations.

The lethality of "combat air support" systems can be enhanced by significantly increasing the size of the ordnance load that is delivered; improving the accuracy of weapon delivery; or by guiding the ordnance to target after weapon release. Angle rate computer-aided weapon delivery systems and optically-guided ordnance are examples of improved combat air support system lethality. The flexibility of employment of combat air support systems can be enhanced by use of laser designators and ground-based radar bombing systems. Laser designators would permit ground elements to locate and select targets for destruction by tactical aircraft. Ground-based radar bombing systems would permit aircraft to attack targets under all visibility conditions. If combat support aircraft can operate effectively without flying over enemy air defense zones, then aircraft losses could be drastically reduced. Stand-off air-to-ground weapons provide the capability for increasing the sustainability of combat air support in this manner.

#### Naval Combat Means

The ocean control sub-category of "naval combat forces" includes a wide variety of naval combat capabilities. Examples of significant improvements in weapon system lethality include radar-guided antiship missiles, and advanced torpedo-guidance systems. Nuclear attack submarines and attack carriers with their air attack capabilities are examples of improved weapon system lethality due to the increased operating range and payload that can be delivered. Airborne early warning aircraft, sub-surface acoustic arrays and towed acoustic arrays, and satellite surveillance systems improve the ability of the naval task forces to detect and engage enemy aircraft, submarines, and surface ships, and thus expand the flexibility of ocean control forces employment. Advanced ship air defense weapons increase the sustainability of ocean control forces opposed by enemy aircraft and antiship cruise missiles. Surface effects ships can effectively evade enemy submarines and torpedo attacks. Nuclear submarines can more effectively evade enemy naval vessels that have antisubmarine warfare capabilities.

The "amphibious assault forces" sub-category of naval combat forces has the mission of projecting naval power ashore. The primary combat elements of amphibious assault forces are the marine combat units, naval gunfire support, and carrier-based attack aircraft. Significant improvements in landing craft, for instance, based on air cushion vehicle technology, and improved vertical assault capability, based on advanced troop lift helicopters, increase the lethality of the assault force. Improvements in the effectiveness of attack air and naval gunfire support similarly increase the lethality of the assault force. The flexibility of employment of amphibious assault forces is constrained by the speed with which the assault force can close on a remote objective and the physical characteristics of the assault beach. Fast deployment ships and surface effects ships can reduce the time required to deploy

amphibious forces. Helicopter assaults and air cushion vehicles can reduce restrictions imposed by terrain obstacles at the landing beach. The sustainability of amphibious assault forces can be increased by reducing casualties enroute and at the landing beach. The surface effects ship and the air cushion vehicle provide potentially significant improvements in assault force survivability because of their increased speed.

#### ASSESSMENT OF MILITARY IMPACT, UNIQUENESS, AND DETECTABILITY OF EXAMPLES OF QUALITATIVE IMPROVEMENTS

Examples of weapon systems that represent qualitative improvements in military capabilities in the context of NATO/Warsaw Pact are identified below. The NATO/Warsaw Pact competition for technological superiority in armaments is the most advanced and the most intense of any region of the world. The conceptual framework for identifying candidate qualitative improvements in weapon systems has therefore been discussed above in terms of NATO and Warsaw Pact military and technological capabilities. The competition for improved armaments between countries in the Middle East and, certainly, between Latin American countries must begin with a careful review of their current capabilities. Qualitative improvements in armaments that were introduced into Central Europe more than a decade ago may not in some cases have been made available to less developed countries.

Major examples of current US/Soviet competition for qualitative advantages in conventional armaments are presented and rated according to their military impact, uniqueness, and detectability in Table 2. For each of the combat forces sub-categories a single weapon system development has been selected within each of the qualitative armaments improvement categories of lethality, flexibility of employment, and sustainability. The examples of qualitative improvements in armaments are currently in the RDT&E stage in either the US, the Soviet Union, or in both countries, and have been selected on the basis of their potential military impact in the European theater of operations.

The selected twenty-one examples of significant weapon system improvements are ranked in Table 2 in terms of military impact, uniqueness, and detectability. The ranking is either high (H), medium (M), or low (L), and is provided in the lower right corner for each element of the array. A high value for military impact indicates that the weapon development will have a significant impact on the balance of forces. A high value for uniqueness means that other types of weapons cannot be effectively substituted for the weapon system improvement if it is barred from further development. A high value for detectability indicates that it will not be possible to deploy the weapon in militarily

Table 2  
MILITARY IMPACT, UNIQUENESS, AND DETECTABILITY  
OF SELECTED EXAMPLES OF US AND SOVIET  
QUALITATIVE IMPROVEMENTS

	Weapon system lethality	Flexibility of employment	Sustainability
<u>Land combat forces</u>			
a. Maneuver elements	Tube launched antitank . guided missile	Instrumented battlefield	Advanced armor for medium tanks
	H, M, M*	M, L, L*	H, H, M*
b. Combat support forces	Cannon launched guided projectile	Real time imagery termi- nals.	Surface-to-sur- face guided missiles
	H, M, L*	M, L, L*	M, M, H*
<u>Air combat forces</u>			
a. Counterair	All aspects air-to-air missile	Airborne command and con- trol aircraft	Manportable anti- aircraft missile
	H, H, L*	L, M, M*	M, M, M*
b. Deep strike	Computer aided weapon delivery avionics	Time of arrival/distance measuring equipment (TOA/ DME) guidance	Armed remotely piloted vehicle
	M, M, L*	M, M, L*	H, M, M*
c. Combat air support	Guided air-to-surface ordnance	Laser designators	Standoff guided missile
	H, M, L*	M, M, L*	H, M, M*
<u>Naval combat forces</u>			
a. Ocean control	Long-range ship-to- ship missile	Satellite ocean sur- veillance	Advanced naval air defense missile
	H, M, M*	M, M, H*	M, M, M*
b. Amphibious assault	Air cushion assault landing vehicle	V/STOL assault carrier	Surface effects ships
	M, M, M*	M, M, H*	H, M, H*

\*High, Medium, Low value for Military Impact, Uniqueness, Detectability, respectively.

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significant quantities without a high probability of detection by the unilateral observation means currently available to the US and the Soviet Union.

If equal importance is given to each of the three ranking categories described above, then the advanced armor for medium tanks, and the surface effects ship are assessed to be the most significant qualitative improvements in armaments. Advanced armor for medium tanks is recommended for examination because it will have the more immediate impact on a NATO/Warsaw Pact conflict.

Armored warfare capabilities are central to the balance between NATO and Warsaw Pact military forces on the European battlefield. The development of second and third generation infantry antitank guided missiles shifts the balance more in favor of the defense. The relevant qualitative improvement in Soviet armaments is a tank with advanced armor that is invulnerable to HEAT warheads employed by modern infantry antitank weapons. Replacement of a significant fraction of Warsaw Pact tanks with a tank that has an advanced armor protection system would be extremely expensive. Soviet development of a tank with such an advanced armor design would in turn force the NATO military units to replace infantry antitank guided missiles with high velocity antitank guns. This would also be a very expensive modification of the NATO force structure. The basis for a US/Soviet agreement to forego this expensive escalation of the arms competition would appear to exist purely on economic grounds.

CONCLUDING REMARKS

This discussion has presented a brief display of some of the principal kinds of qualitative improvements that are being made or could be made in conventional armaments. These examples of NATO/Warsaw Pact arms competitions reflect the enormous complexity of the task that would be involved in attempting to classify the possibilities and permutations for various arenas of potential conflict.

This conceptual framework may help to organize analysis of the impact that each type of qualitative improvement might have on the capabilities and effectiveness of the forces involved in these competitions.

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Appendix B

ARMS COMPETITION IN THE MIDDLE EAST

William W. Cover

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Appendix B

ARMS COMPETITION IN THE MIDDLE EAST

PURPOSE AND SCOPE

The purpose of this appendix is to depict the forces, expenditures, and particularly the major armaments situation in seven selected countries of the Middle East in order to: (1) emphasize the factors influencing acquisition trends; (2) illustrate the patterns of change over time, both within each of these countries and comparatively between them; and (3) show the current armed forces status of each country, pointing out the highest qualitative levels presently held and indicating identifiable trends of further qualitative acquisition.

Unclassified data estimating force levels, expenditures, and armaments vary among agencies and publishers, are subject to continuous re-evaluation, and often are based on differing definitions — making the mixing of data from different sources a hazardous process requiring explanatory qualification. The principal sources for the accompanying tables have been the publications of ACDA, the IISS, SIPRI, and Jane's, augmented by other current references (Refs. 1-6). These tables are not exhaustive and do not present new or previously unpublished data; their purpose is to assemble selected data for the subject countries in convenient, comparative form. Individual numbers are of less importance than the relations among numbers and their trends in time, since these relations indicate the comparative patterns and rates of quantitative and qualitative change.

The selected countries include the principal consumer states of the Middle East, all of whom except Iran are directly involved in the Arab-Israeli conflict. Not included are Greece and Turkey, Kuwait and the peripheral states of the Arabian Peninsula, and the Arab states of North Africa: i.e., Morocco, Algeria, Tunisia, and Libya. Both Greece and Turkey are large consumers of weapons and are deeply involved in US interests — but in the context of their membership in NATO and of the Cyprus question. The Arabian peripheral states and the states of North Africa have also shown upward trends in armament procurement; all have been and are involved in varying degrees in the Arab-Israeli conflict; and — because of their wealth, resources, and relationships in intra-Arab politics and economics — are certainly influential in regional affairs. However, the leading countries in qualitative and quantitative arms acquisition are the seven emphasized in this appendix.

## GENERAL TRENDS

At the end of World War II the military forces of the independent and soon-to-be independent countries of the Middle East were rudimentary: small in size, deficient in organization and training, and ill-equipped with World War II or earlier arms, mostly of British, French, or German origin or American salvage. Because of the long-standing British pre-eminence in the Middle East, the major supplier had been Great Britain. Excluding Greece and Turkey from the Middle East (many analysts would include them), the emergent states of the region were all Arabic and overwhelmingly Islamic except for Iran, which is Islamic but not Arabic, and Israel. Initial arms procurements after the war were generally piece-meal salvage, grant, or purchases of war surplus stocks from Great Britain and Western Europe and from commercial arms dealers.

It is a normal expectation for newly-independent sovereign states to provide for internal security and the common defense by developing effective armed forces. When these states are also in an emergent, developing status and intent, to some degree at least, on modernization, this expectation is accentuated. A modernizing state will seek to modernize its armed forces along with its economy — sometimes, ahead of its economy.

Historically, the Ottoman sultans and pashas of the nineteenth century, reeling under the shocks of conflict with Europe, eagerly sought Westernization — not in government, social services, or law, and certainly not in religion, but in modernized armaments and the industrial and logistical capacity to support them. Elsewhere in the Middle East, no ruler of a remote desert sheikhdom at the turn of the century would have kept his personal security forces armed with the ancient long-barreled bedouin musket when he could equip them with bolt-action rifles. From this point, it is only a succession of steps in time to tanks, aircraft, and missiles.

In the Middle East, the process of improving arms both qualitatively and quantitatively that appears to be natural to emergent, security-conscious states was accelerated by a number of important factors that operated in the various stages of acquisition and development. The process was sporadic and not uniform among these consumer countries and sometimes slowed to a plateau before spurting upward again; but the general trend separately in each country and collectively among them has always been upward — in quality and quantity (see Tables 1-5) (Ref. 7).

The sequence of major armament procurement has, in general, been a logical corollary of the various stages of organization and development of the armed forces — including technological capacities, the amounts of military funding, and the availability of arms from suppliers by sale or grant. The evolution of Israel's armed forces in their four major wars reveals this relationship between the foregoing factors, military doctrine, and qualitative escalation. Infantry formations and infantry

Table 1  
COMPARATIVE ECONOMIC-MILITARY AND POPULATION DATA FOR  
MAJOR CONSUMERS IN THE MIDDLE EAST<sup>a</sup>

Country or Region	GDP (\$ billions)		MILEX (\$ billions)		Relative Burden (%)		MILEX/Capita (\$)		GDP/Capita (\$)		Arms Imports (\$ millions)		Population (millions)		Armed Forces (thousands)		MILEX/ Armed Forces (\$)		Armed Forces/ 1000 people		
	1973	Growth <sup>c</sup>	1972 <sup>d</sup>	Growth <sup>e</sup>	1973	Growth <sup>e</sup>	1973	Growth <sup>e</sup>	1973	Growth <sup>e</sup>	1973	Growth <sup>e</sup>	1973	Growth <sup>e</sup>	1973	Growth <sup>e</sup>	1973	Growth <sup>e</sup>	1973	Growth <sup>e</sup>	
Middle East <sup>b</sup>	50.6 <sup>d</sup>	6.7	6.03	14.7	11.84 <sup>d</sup>	10.7	56.03 <sup>d</sup>	11.3	417	3.5	3673.1	223.06	9447	110.77	3.0	1283	6.7	4829 <sup>d</sup>	7.5	11.58	3.6
Egypt	7.77 <sup>d</sup>	3.2	1.14	10.3	15.06	7.2	33.12 <sup>d</sup>	7.9	227	0.9	454.5	34.89	2507	35.100	2.3	390	10.1	2913 <sup>d</sup>	0.4	11.11	7.6
Iran	18.86	10.9	1.70	22.7	11.45	10.6	64.82	19.1	566	7.6	430.9	42.37	2044	31.300	3.1	285	3.6	7574	18.4	8.56	0.5
Iraq	3.90	5.8	0.47	9.0	12.77 <sup>d</sup>	2.9	47.35 <sup>d</sup>	5.6	377	2.5	289.8	7.43 <sup>e</sup>	874	10.354	3.3	105	2.6	4513 <sup>d</sup>	6.0	10.14	-0.5
Israel	7.17	8.2	3.49	25.7	45.41	16.1	1003.92	22.0	2211	5.0	1625.9	87.79	1531	3.243	3.0	130	9.1	25044	13.2	40.09	5.9
Jordan	0.68	2.2	0.12	7.1	16.91	3.4	50.46 <sup>d</sup>	3.6	271	-1.1	61.6	5.36	354	2.54	3.3	70	4.8	1760 <sup>d</sup>	1.9	27.84	1.4
Saudi Arabia	5.06	9.4	0.65	12.8	14.67 <sup>d</sup>	3.3	114.06 <sup>d</sup>	9.9	861	6.5	65.3	4.03	537	5.881	2.7	75	8.7	8440 <sup>d</sup>	3.2	12.75	5.8
Syria	2.15	6.3	0.25	11.8	12.25 <sup>d</sup>	5.4	37.24 <sup>d</sup>	8.2	310	2.9	685.6	37.57	1244	6.922	3.3	115	4.8	2164 <sup>d</sup>	8.2	16.61	0.7

<sup>a</sup>Data adapted from ACDA, World Military Expenditures and Arms Trade 1963-1972, all dollar amounts are expressed in terms of 1972 constant dollars.

<sup>b</sup>allowing for inflation (Ref. 1).

<sup>c</sup>Bahrain, Cyprus, Egypt, Iran, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen (Aden), Yemen (Sana).

<sup>d</sup>Percent annual growth rates for the period 1963-1972 (all "growth" columns except "arms imports" — see note e).

<sup>e</sup>1972 data (1973 data not available).

<sup>f</sup>Average annual growth in arms imports in \$ millions.

<sup>g</sup>1973 data only available for Iran (2.16) and Israel (3.26).

<sup>h</sup>Current dollars (1973).

Notes: The above seven countries account roughly for 90 percent of the region's GDP, 95 percent of its military expenditures, 98 percent of 1973 arms imports, 96 percent of the imports during the period 1964-1973, 88 percent of the population and 91 percent of the armed forces.

Table 2

MILITARY EXPENDITURES, 1963-1973<sup>a</sup>  
 (millions of 1972 constant dollars)

	Egypt	Iran	Iraq	Israel	Jordan	Saudi Arabia	Syria
1963	484	269	218	286	77	146	101
1964	512	315	296	362	79	154	92
1965	587	429	304	357	79	139	91
1966	458	483	295	429	85	168	89
1967	422	659	279	672	99	336	95
1968	574	792	382	838	139	205	155
1969	656	956	477	1136	152	234	158
1970	933	1051	453	1484	118	221	195
1971	1017	1347	490	1491	120	260	171
1972	1136	1705	474	1491	123	651	249
1973	1324 <sup>b</sup>	2159	558 <sup>b</sup>	3256	136 <sup>b</sup>	1073 <sup>b</sup>	274 <sup>b</sup>
Growth (Per- cent Annual)	10.3	22.7	9.0	25.7	7.1	12.8	11.8

<sup>a</sup>Source: Ref. 1.

<sup>b</sup>Current 1973 dollars, constant dollar figures not available.

Table 3

THE ARMS TRADE (IMPORTS) 1963-1973<sup>a</sup>  
(millions of constant 1972 dollars)

	Egypt	Iran	Iraq	Israel	Jordan	Saudi Arabia	Syria
1963	204.5	36.8	145.9	27.3	4.1	6.8	47.7
1964	103.4	34.9	37.6	92.6	24.2	9.4	21.5
1965	108.1	44.8	58.0	60.6	21.1	35.6	13.2
1966	147.5	71.8	44.9	47.4	29.5	32.1	19.2
1967	253.5	129.2	111.8	28.6	21.1	58.4	72.1
1968	138.6	161.3	158.9	65.7	29.9	94.4	47.8
1969	127.7	253.0	78.6	185.8	82.1	94.6	54.7
1970	708.8	172.9	48.6	250.7	51.9	28.1	65.9
1971	372.1	305.0	36.2	265.7	54.8	19.6	113.7
1972	303.1	431.0	85.0	214.0	48.0	52.0	163.0
1973	454.5	430.9	289.8	1625.9	61.6	65.3	685.6
Cumu- lative	2921.8	2071.6	1095.3	2864.3	428.3	476.3	1304.4
Average Annual Growth	34.89	42.37	7.43	87.79	5.36	4.03	37.57

<sup>a</sup>Source: Ref. 1.

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Table 4

RELATIVE BURDEN<sup>a</sup>  
 (Percentage Ratio of Military Expenditures to GNP)

	Egypt	Iran	Iraq	Israel	Jordan	Saudi Arabia	Syria
1963	8.61	4.16	10.22	8.58	15.25	7.48	8.71
1964	8.56	4.47	12.49	9.91	13.14	7.08	7.28
1965	9.20	5.48	11.36	8.96	11.86	5.70	7.01
1966	7.13	5.58	10.46	10.64	12.22	6.29	6.96
1967	6.67	6.85	10.25	16.32	13.31	11.33	7.07
1968	8.74	7.44	12.34	17.70	19.46	6.50	11.02
1969	9.59	8.26	14.76	21.35	19.34	6.88	9.73
1970	12.96	8.21	13.60	25.92	16.80	6.02	11.77
1971	13.70	9.41	13.44	23.75	16.77	6.43	9.10
1972	14.62	10.61	12.77	21.62	17.43	14.67	12.25
1973	15.06	11.45	n.a.	45.41	16.91	n.a.	n.a.
Percent Annual Growth	7.2	10.6	2.9	16.1	3.4	3.3	5.4

<sup>a</sup>Source: Ref.1.

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Table 5

THE MILITARY BALANCE 1975-1976<sup>a</sup>

	Egypt	Iran	Iraq	Israel	Jordan	Saudi Arabia	Syria
GNP (estimated 1974, \$billions)	17.9	35.6	5.6	11.7	1.0	12.0	2.9
Defense Budget/Expenditures \$millions	6103 <sup>b</sup>	10405 <sup>b</sup>	803 <sup>c</sup>	3503 <sup>b</sup>	155 <sup>d</sup>	6343 <sup>b</sup>	668 <sup>d</sup>
Population (millions)	37.520	31.180	11.090	3.360	2.730	8.910	7.370
Armed Forces (thousands)	322.5	250.0	135.0	156 (400 w/in 72 hrs)	80.25	47.0 (+15.0?) (NATL GD)	177.5
Army (thousands)	275	175	120	135 (375 on mobili- zation)	75	40 (+15.0?) (NATL GD)	150
Lt & Med Tanks	1975	1160 (+1930 on order)	1290	2700 (+unk. no. on order)	440 (+unk. no. on order)	235 (+unk. no. on order)	2170
Navy (thousands)	17.5	15	3	5 (6 on mobilization)	0.250	1.50	2.50
Ships (all types)	101	56 (+23 on order)	29	66 (+3 on order)	12	4 (+14 on order)	19

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Table 5 (contd)

	Egypt	Iran	Iraq	Israel	Jordan	Saudi Arabia	Syria
Air Force (thousands)	30	60	12	16 (20 on mobiliza- tion)	5	5.5	25
Combat Aircraft (all types)	500	238 (+449 on order)	247 (+10 on order)	461 (+55 on order)	42 (+36 on order)	95 (+138 on order)	400 (+ unk. no. on order)

<sup>a</sup>Source: The Military Balance 1975-1976 (Ref. 2).

<sup>b</sup>1975-76.

<sup>c</sup>1974-75.

<sup>d</sup>1975.

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weapons are easiest to form and to obtain and had to come first. Other arms were developed as fast as possible and later came to prominence as shown below (Refs. 8, 9).

<u>War</u>	<u>Dominant Arm</u>	<u>Dominant Doctrine</u>
1948	Infantry	Reliance on conventional infantry, with such support as available.
1956	Armor	Blitzkrieg tank attacks, supported by fighter aircraft, infantry, and artillery.
1967	Tank-Fighter team	Attack fighters destroy enemy air forces; coordinate closely with armor and armored infantry to defeat enemy ground forces.
1973 (and later)	Combined arms, all using missiles	High technology in weapons, air and ground vehicles, command and control, and fire direction: all arms.

The evolution of Arab and Iranian forces has roughly followed the same sequential, overlapping stages of development — infantry, artillery, armor, air forces, missiles, and high, coordinated technology — but at varying and much slower rates of development. Neither unlimited funds nor unlimited supply can compensate quickly for planning, training, and technological shortcomings that take decades to overcome. Not until 1973 did Egypt, the leading Arab state, put together a combination of weapons, forces, training, planning, leadership, and vigor in execution that was sufficient in quality and quantity to score tactical successes against the Israelis and avoid being defeated.

### FACTORS INFLUENCING ACQUISITION PATTERNS

To label the present proliferation of advanced conventional arms in the Middle East a "race" is an over-simplification. It is indeed accurate in reference to the Arab-Israeli conflict. The Iranian expansion, however, appears more like the unilateral establishment of a highly visible, overwhelming military superiority in the Persian Gulf region which may serve foreign policy purposes very well without ever being used. Further, among the small states on the periphery of the Arabian Peninsula, several are now oil-rich and are acquiring sophisticated military equipment that may, to some extent, be intended for transfer to one or more of the confrontation states facing Israel or may simply represent the acquisition of the appurtenances of modern independent statehood. In 1976, if one buys a new or even fairly new motor patrol boat it will not turn out to be a

PT-109. It will be a qualitatively improved product with high speed and durability, missile or torpedo or automatic cannon armaments, and advanced navigation and communications equipment. In this sense, the Sheikh of Qasr Kabir can scarcely be accused of contributing to a qualitative arms race, since he has no other choice except that of not buying a patrol boat at all.

Whether seen in terms of a race, a competition, or other designations, the patterns of arms acquisition in the Middle East have been influenced by a number of political, military, and economic factors. Some of these are indicated below in a chronological summary, without extensive elaboration. These events largely determined the general trend of expansion and the upgrading of forces and arms in the region (Ref. 10).

1. The Arab-Israeli War of 1948, establishing the state of Israel and creating the Palestinian problem, was a severe shock to the Arab states, most of whom (although not all then fully independent) were governed by traditional elites who had come to power out of the first impulses of Arab nationalism in the World War I era. Grave deficiencies in Arab military equipment, organization, training, and leadership were revealed, as well as the difficulties of intra-Arab political and military coordination (Refs. 11, 12).

2. All states in the area were dependent on foreign arms supply. The Arab states were hampered in military development not only by economic, political, and military weaknesses, but by their low levels of literacy and technological capacity. Gradually, these deficiencies were and still are being corrected. Israel, with whom hostilities were concluded in 1948-49 only by armistices and not by final settlements, became a garrison state confronted by uniform, hostile Arab non-acceptance; its people, however, were characterized by high literacy and — compared to the Arabs — high technological orientation. The Israeli workshop arms industry that was already producing some simple weapons by 1949, was quickly expanded. The Israelis' rapid mobilization system, and, above all, their doctrine of qualitative superiority developed quite early as the key military means of offsetting the vast Arab numerical advantages and the possibility that these advantages might some day be jointly exercised in whole or in part against Israel.

3. Noting the prospects for a renewal of Arab-Israeli warfare and the dissensions within the Arab League because of Jordan's annexation of the "West Bank" — the only substantial part of Palestine retained by Arab (Jordanian) forces in the 1948 war — the governments of the US, UK, and France issued the Tripartite Declaration of 25 May 1950 declaring "their opposition to the development of an arms race between the Arab states and Israel" and an intention to review in this light all applications for arms from these countries. At the same time the three powers recognized the need of all these states for certain levels of armed forces for internal security and self-defense and "to permit them to

play their part in the defense of the area as a whole" (Ref. 13, p. 138). The Tripartite Declaration did not become an effective instrument of control and soon atrophied to impotence. France became and remained for about a decade and a half the main source of arms supply to Israel; the Arab states bought arms sporadically from Great Britain and France. Of the three, only the United States — until the early 1960's — refrained from becoming a major supplier to the states involved in this conflict. (Some US supply had begun in the late 1950's.) The Tripartite Declaration, however, in the last quotation above presaged the later unsuccessful attempts to develop a Western oriented and Western dependent alliance system among the Arab states against the USSR and "international communism" (Refs. 12, 13).

4. The military coup of July 1952 by Nasser, Sadat, and their associates overturned the monarchy in Egypt and raised the wave of new Arab nationalism that soon divided the Arab world between traditional (monarchical), moderate, and "radical" governments — the latter following either some form of the "Arab socialism" espoused by Nasser or that of the Baath (Resurrection) party of Syria. These divisions, Egypt's aspirations as symbolized by Nasser to bring about Arab unity (both for its own sake and as a precondition for defeating Israel), and the determination of all Arab states to gain full independence stimulated all of them to expand and improve their armed forces for reasons of external and internal security, for confrontation with Israel, and — in some cases — for political aggrandizement (Refs. 14 - 17).

5. Highly sensitive to any arrangement suggesting external controls and resurgence of Western imperialism, Arab nationalists in Egypt and elsewhere rejected alliance proposals in which they saw themselves as being used. Egyptian negotiations for arms assistance from the US were terminated by Egypt on grounds that the US proposals had "strings attached." By September 1955, Egypt's anxiety concerning Israeli intentions, always believed or alleged by Arabs to be expansionist, had mounted. In that month, announcement was made of the contract for military supply from Czechoslovakia to Egypt. The importance of this arrangement, engineered by Moscow, can scarcely be overestimated. Until that time, the USSR had no position of influence or arms supply connection in the Middle East (Refs. 16 - 18).

6. In July 1956, Nasser — seeking what he presented as an even-handed and independent Egyptian course — expressed affirmative interest in the US/UK offers of assistance in building the Aswan High Dam, but on 18 July US Secretary of State Dulles abruptly withdrew the US offer and the UK did likewise. Nasser, one week later, retaliated by nationalizing the Suez Canal, thus infuriating the UK and France. On 29 October, Israel attacked in the Sinai and on 5 November a British and French invasion force attacked Port Said. Under pressure from the US, USSR, and UN, all forces were soon withdrawn. Arab military forces, however, had been beaten again — and badly.

7. The succession of events of 1954-1956 convinced Nasser and radical Arab nationalists everywhere of the perfidy of the West and its creation — Israel. All these evidences successively reinforced each other and became compounded in a mounting crescendo of anti-Westernism — but not pro-Communism, as such, for no Arab state had or now has a communist government. Major Soviet influence entered the Middle East, however, in 1955. The USSR declared its support of the general Arab stance against Israel; and Soviet arms poured into Egypt, Syria, Iraq, Algeria, and Yemen. The Arab-Israeli conflict was now polarized in the Cold War context. The monarchies and moderate states generally did not accept Soviet supply, relying on Western Europe, the international trade, and, increasingly, the US (Refs. 12, 18, 19).

8. On the Persian Gulf, Shah Mohammad Reza Pahlevi and his government survived the leftist shocks of the Mossadeq period of 1952 and 1953, and began the steady consolidation and confirmation of power that was to endure later shocks in the early 1960's before emerging unchallenged. While coopting his political opposition, joining CENTO, establishing strong relations with the US, and at the same time skillfully improving relations with the USSR, the Shah increasingly involved his country in his own programs, developed his oil wealth, established stability at home and an independent position abroad, and finally set about the present expansion of Iranian military forces that will assure Iran a principal voice if not hegemony in the Gulf region (Ref. 10).

9. By the early 1960's the arms and equipment of Egyptian, Syrian, and Iraqi forces were mostly Soviet; and Soviet training — in-country and in the USSR — was provided. Nasser's ill-starred intervention in the Yemen, lasting from 1963 to late 1967, caused accelerated arms procurement. Intra-Arab political tensions exacerbated Arab-Israeli tensions. In early June 1967, Israel, considering the threat of Arab deployments to have reached the intolerable level, launched the massive air strikes against Egypt, Jordan, Syria, and Iraq that effectively destroyed their air forces. Defeat of the Arab ground forces then followed, as Israel seized the Sinai Peninsula (Egyptian), the West Bank (Jordanian), and most of the Golan Heights (Syrian) in a near-perfect exemplification of the Israeli doctrines of initiative, speed, mass, and military decisiveness. Arab forces were crushed and humiliated as never before. Immediately, despite the intoxication of this stunning military victory, Israel set about procurement of advanced military equipment from the US and France with the aim of insuring and projecting the qualitative supremacy it had just displayed. The USSR, protecting its influence and the investment of its prestige in Egypt and Syria, replaced the Egyptian and Syrian losses with startling rapidity and intensified its training missions to a new high (Refs. 12, 20).

10. The hostilities of the short 1967 war were terminated by ceasefires, not by settlements. A framework of settlement was worked out

in UN Security Council Resolution 242 of 22 November 1967, accepted with reservations by Egypt and Jordan, with extensive reservation by Israel, not at all by Syria, and implemented by no one. Pieces of Egypt and Syria proper were now in Israeli hands. Israel had withdrawn from the Sinai in 1956-57 under pressure, but with future assurances from the United States. In the Israeli view, these assurances had not been fulfilled in 1967; and Israel would not, after 1967, withdraw under diplomatic pressure from the UN, the US, or anyone else. A limited conventional war of attrition developed in 1969 and 1970 along the Suez Canal and the Soviet Union installed integrated air defense systems based on the SA-2, 3, and later the SA-6 for Egypt along the canal and for Syria along the Golan line. Meanwhile, the Arab guerrilla movements rose to complicate — but not decide — the situation and stymied a US-sponsored ceasefire along the canal in September 1970 by precipitating the Jordanian civil war which saw the PLO bands driven from Jordan by July 1971. Egyptian, Syrian, and Israeli forces became increasingly armed with and oriented to high technology weapons. A situation of "no peace, no war" prevailed and became politically intolerable for Egypt's President Anwar Sadat, who had succeeded to office following Nasser's death on 28 September 1970 (Refs. 12, 21, 22).

11. Becoming dissatisfied with the pace and quality of Soviet arms aid, especially in high-performance aircraft and missiles, Sadat in July 1972 abruptly dismissed about three-fourths of the oppressively large Soviet advisory contingent and instructed the Egyptian General Staff to intensify planning for an attack across the Suez Canal against Israeli forces on the east bank. Because of the abysmally poor performance of Egyptian air defense and air forces in 1967, particular attention was given to this aspect. In this sense, the Soviet provision of advanced defensive weapons for air defense in 1969 and 1970 was actually destabilizing, because without this system Egypt could not have planned the attack of 6 October 1973, coordinated with a simultaneous Syrian attack in the Golan. With a new air-defense system, however, both had sufficient confidence to plan offensive operations with some hope of success (Refs. 22 - 27). The Egyptian/Syrian attacks, particularly the cross-canal assault, were initially successful. The SA-6/SA-2/automatic cannon air defense was highly effective until Egyptian forces got beyond its cover; the Soviet Sagger antitank infantry weapon was effective against Israeli tanks, especially if not accompanied by infantry. The Soviet T-62 tank performed well, although apparently was outclassed by the US M-60 at longer ranges. The Arab tactical successes that were gained in the war of 6-24 October 1973 established real Arab military confidence for the first time, shattered the myth of Israeli invincibility, and raised Arab morale to a new sense of modern self-esteem from Morocco to the eastern borders of Iraq.

12. One of the major factors at work in the Arab preparation for the 1973 war was the essential rapprochement developed between Sadat and Saudi Arabia's late King Faisal, transcending in a higher Arabism

the narrow Nasserian confines of "radical" states as opposed to monarchies. When Sadat diminished his Soviet connection in 1972, he relied first on the wealth of neighboring Libya and the mercurial Qadhaafi government. This alignment proved unstable and he developed the solid connection with Saudi Arabia, which may be said to have "bank-rolled" his military and economic preparations and still continues. Algeria, Kuwait and some of the peripheral states also contributed. A development of the first significance in the 1973 war and in the temporary Arab oil embargo against the West that followed was the demonstration for the first time of an effective degree of intra-Arab coordination in strategic political, military, and economic action. This development and its implications were not lost on Israel (Ref. 24).

13. The Sinai disengagement agreements of 18 January 1974 and 1 September 1975 engineered by US Secretary of State Kissinger have restored a part of the Sinai to Egypt, but were apparently purchased at the price of enormous, continuing US military aid to Israel and transfers of increasingly high-sophistication weapons. Syria has disagreed politically with the agreements made by Egypt, and has been resupplied by the Soviet Union. Although Israeli losses were quickly replaced by the United States to the tune of \$5 billion or more, and have since been extended, Egypt's losses were not similarly replaced by the Soviet Union in the manner of 1967. Soviet supply to Egypt in early 1974 was mostly in the form of completion of existing contracts, and since then has proceeded slowly. This attenuation of the Soviet relationship brought about the Egyptian search for diversification of arms supply and subsequent major contracts with Great Britain and France. By mid-1975 all three major participants in the 1973 war had regained and passed in quality and quantity the weapons levels they held at the start of that war (Refs. 28 - 31).

14. The withdrawal of Great Britain in 1970-71 from its last positions in the Persian Gulf area and the expansion of oil revenues among some of the small peripheral states have stimulated arms acquisitions in this region. The latter has also made money available for intra-Arab purposes. Saudi Arabia, with literally more money than it can spend, has similarly increased military expenditures for its own forces, including funds for rehabilitating the National Guard, for naval (coast guard) development, and for intra-Arab purposes. Military purchase orders for 1975 were estimated at the record high of \$1.2 billion. The US policy of encouraging military sales, notable since late 1972, has facilitated acquisitions by Saudi Arabia, Jordan, Iran, Kuwait, and others. Sales orders turned down by the FRG have quickly been picked up by other suppliers. The central arms stimulus remains the Arab-Israeli conflict. The Palestinian issue is unsettled, but the PLO has gained wide political support in the UN. No outline of a general and final settlement has been agreed on nor is one under active official negotiation as publicly known at this time. The visits to the US of President Sadat in October 1975

and Prime Minister Rabin in January 1976 may have contributed to this end. Israel fears the Arab states are bent on its extinction; the Arab states want redress of the grievances of 1948 and the losses of territory of 1967 and fear further Israeli aggrandizement at their expense. Each adversary fears that the other may secure the capability to execute a decisive first strike so crippling as to preclude effective retaliation (both sides have in the past launched major surprise attacks). Neither will accept any combination of quality and quantity which does not meet its own minimum estimate of parity. Meanwhile, the civil conflict in Lebanon has enriched commercial arms dealers (Refs. 31-34).

#### PRINCIPAL ARMAMENTS

The discussion in this section and the data in the accompanying tables deal with tanks (excluding light tanks, armored cars, and armored personnel carriers), sophisticated aircraft, missiles, and naval warships to show levels of long-range, high-capacity armaments that may be considered destabilizing and the qualitative (technological) spread. Infantry and artillery weapons are not included except as certain missiles are particularly identified with these arms. Generally, improvements in infantry and artillery weapons have accompanied the rise in quality and quantity of main armaments. Israel, although holding 175mm guns and other calibers of the latest US field artillery and capable of their effective use, cannot compete in massed artillery fires with the volume of excellent Soviet artillery held by Egypt and Syria. Israel, in the past, has often used close support aircraft in lieu of artillery. Somewhat similarly, Israel has been at a comparative disadvantage with Egypt in ground air defense (missiles and antiaircraft cannon) and has emphasized interceptor air defense (Refs. 7, 8, 9). After the 1973 war, Israel moved to upgrade its air defense missile capabilities, self-propelled artillery, and armored fighting vehicles.

#### Tanks

The most advanced tanks now in the Middle East are the US M-60 and M-60A1, the Soviet T-62, the British Chieftain, and the French AMX-30. In numbers, Israel's inventory — including T-54/55 and T-62 tanks captured in 1967 and 1973 — exceeds either Egypt or Syria. Israel, with a larger number of types, relies on the British Centurion, the US M-48 and M-60, and is moving to an emphasis on the M-60 series. Both Syria and Egypt base their armor strength on the Soviet T-55 and T-62, but some reports indicate Egyptian orders have been placed for the French AMX-30. When present orders are filled for 1680 British Chieftains, the leading Middle East tank holder in numbers, uniformity, and quality may be Iran, with about 2000 Chieftains and at least 460 M-60A1's (see Tab. 6).

Table 6

MEDIUM TANKS<sup>a, c</sup>

	1965-66	1970-71	1975-76	On order
Egypt	60 JS-III 400 T-34 30 Centurion 350 T-54	10 T-10, 30 JS-III 15 Sherman 250 T-34 10 Centurion 950 T-54/55	25 JS-III/T-10 1100 T-54/55 820 T-62	AMX-30?
Iran	400 M-47 <sup>b</sup>	400 M-47 <sup>b</sup> 460 M-60A1 <sup>b</sup>	400 M-47/48 460 M-60A1 300 Chieftain	1680 Chieftain
Iraq	110 Centurion <sup>b</sup> 125 T-34 <sup>b</sup> 250 T-54 <sup>b</sup>	450 T-54/55 140 T-34 55 Centurion	90 T-34 1200 T-62/55/54	
Israel	600 Centurion, Super Sherman, M-48	200 Super Sherman 300 M-48 w/105mm gun 450 Centurion 100 T-54/55	200 Super Sherman 900 Centurion 400 M-48 450 M-60 400 T-54/55 150 T-62 ? Sabra	200 M-48 400 M-60
Jordan	50 Centurion <sup>b</sup> 150 M-47/48 <sup>b</sup>	150 Centurion 160 M-47/48	200 Centurion 240 M-47/48/60	
Saudi Arabia	55 M-47	55 M-47	25 M-47 150 AMX-30	250 AMX-30 & M-60
Syria	50 old German tanks <sup>b</sup> 200 T-34 <sup>b</sup> 35 JS-III <sup>b</sup> 150 T-54 <sup>b</sup>	30 JS-III 150 T-34 700 T-54/55	100 T-34 1300 T-54/55 700 T-62	T-62/55/54

<sup>a</sup>Source: Ref. 2.<sup>b</sup>Source: Ref. 4.<sup>c</sup>Origin and current qualitative class of tanks (A--modern, B--mid-fifties standard, C--post-WWII obsolete):

United States -- M60 and M60A1 (A), M-47 and M-48 (B), M-4 Sherman (C)  
USSR -- T-62 and T-55 (A), T-54 and T-10 (B), JS-III and T-34 (C)  
United Kingdom -- Chieftain (A), Centurion (B)  
France -- AMX-30 (A)  
Israel -- Super Sherman (B), M-48 w/105mm gun (A), Sabra  
(A -- Few data available -- believed to be  
40 ton w/105mm guns, first indigenously designed  
and produced tank).

Sophisticated Aircraft

Qualitatively, the United States F-4 and later aircraft held by Israel and, in lesser numbers, by Iran, have been superior. They surpass the Soviet MIG-21's and SU-7's and, probably, the MIG-23's of the Egyptian, Syrian, and Iraqi air forces in the multipurpose attack, support, intercept, and reconnaissance roles in which the Israelis have so effectively employed them (see Table 7). Both Israel and Iran are receiving US F-14's and commitments appear to have been made by Secretary Kissinger in August 1975 to supply Israel with the F-16 when it comes off the production line.

No other qualitative arms aspect — except, possibly, for long-range missiles — has disturbed Egypt's Sadat so much as the Israeli edge in sophisticated fighter bombers and their missile armaments. He can hope to make up differentials in pilot skill by training, and great progress was made between 1967 and 1973. A flight of MIG-25's was reportedly stationed at Cairo in 1975 under strict Russian control, but none are known to have been transferred to Egypt or Syria. The Egyptian contract in January 1975 (with Saudi and Kuwaiti funds) for 44 French Mirage F-1's may, according to press reports, include 22 F-1's and 22 F-3's still in early production, the F-3 being the latest French bid for an air superiority fighter. As the larger air forces — of Israel, Iran, and Egypt — stock up on F-14 and 15's, MIG-23's, and advanced Mirages, Jordan and Saudi Arabia have graduated to the F-5 category (Refs. 30, 31).

Small numbers of Soviet TU-16 and IL-28 bombers are held by Egypt, Syria, and Iraq, but these aircraft have never figured prominently in Middle East air warfare operations. The TU-16's, however, are reportedly armed with the AS-5 (Kelt) long-range air-to-surface missile. Israeli air doctrine has deliberately excluded the bomber category of aircraft, preferring the multipurpose heavy fighter-bomber of the F-4 and A-4 types (Refs. 2, 8).

Guided Missiles

The profusion of missiles now held by Middle Eastern ground, air, and naval forces is shown in Tables 8 and 9. Of particular concern are the longer-range missiles of the Soviet Frog and Scud types in the Egyptian and Syrian inventories and the US Lance acquired by Israel, with the added possibility of Israeli acquisition of the US Pershing as an outcome of Secretary Kissinger's negotiations in August 1975. The potential for heavy damage on deep targets by these weapons using conventional warheads is in itself serious, and the graver question of nuclear capability is apparent. The possibility is thus raised of the emergence in the Middle East of a strategic arms confrontation somewhat like that between NATO and the Warsaw Pact, with the attendant questions of nuclear strategy and balance. Israel is widely believed, although not officially known, to have nuclear warheads or components for their ready assembly. Egypt's

Table 7  
 SOPHISTICATED AIRCRAFT<sup>a,d</sup>

	1965-66	1970-71	1975-76	On order
Egypt	52 MIG-21 (400) <sup>f</sup>	150 MIG-21 105 Su-7 (415) <sup>f</sup>	48 MIG-23 80 Su-7 322 MIG-21 3 Mirage V <sup>b</sup> (500) <sup>f</sup>	44 Mirage F-1
Iran	106 F-5 <sup>b</sup> (130)	139 F-5 <sup>b</sup> 64 F-4 (230)	96 F-4D/E 80 F-5A 45 F-5E (238)	80 F-14 190 F-4 179 F-5E
Iraq	12 MIG-21 <sup>b</sup> (210)	60 MIG-21 (229)	30 MIG-23 60 Su-7 (247)	
Israel	72 Mirage III 24 Super Mystere <sup>b</sup> 60 Mystere IVA <sup>b</sup> 24 Vautour <sup>b</sup> (450)	12 Vautour 36 F-4E 67 A-4E 60 Mirage III 30 Mystere IVA 10 Super Mystere (330)	200 F-4E 75 Mirage III/ Kfir 200 A-4 48 F-14 48 F-15 (461)	35 F-4 20 A-4
Jordan	(50)	36 F-104 (38)	24 F-5A 18 F-104 (42)	36 F-5E/B
Saudi Arabia	6 Lightning <sup>b</sup> (33)	35 Lightning (75)	30 F-5E 35 Lightning (95)	100 F-5E/F 38 Mirage V <sup>c</sup> 38 Mirage III <sup>e</sup>
Syria	— (136)	40 Su-7 90 MIG-21 (210)	45 Su-7 45 MIG-23 250 MIG-21 (400)	7 MIG-21

<sup>a</sup>Sophisticated aircraft have been defined by SIPRI as trans- and supersonic aircraft, including the following:

Table 7 (continued)

<u>Producer/Supplier</u>	<u>Aircraft</u>	<u>Date of first production</u>	<u>Date first introduced to recipient</u>
United States	F-4 Phantom	late 50's	Iran (68), Israel (69)
	F-5 Freedom fighter	1958	Iran (65), Jordan (72), Saudi Arabia (73)
	F-5E Tiger II	1972	Iran (74), Jordan (73), Saudi Arabia (74)
	F-104 Starfighter	1956	Jordan (67)
	A-4 Skyhawk	1953	Israel (68)
	F-14 Tomcat	1972	Iran (on order), Israel (75)
	F-15 Eagle	1972	Israel (75)
USSR	MIG-21	1956	Egypt (62), Iraq (63), Syria (67)
	MIG-23	1967	Iraq (74), Syria (74)
	SU-7	1956	Egypt (67), Iraq (67), Syria (69)
France	Vautour	1952	Israel (57)
	Mystere IVA	1952	Israel (55)
	Super Mystere	1957	Israel (59)
	Mirage III	1962	Israel (62), Saudi Arabia (on order)
	Mirage V	1966	Egypt (74, via Saudi Arabia)
	Mirage F-1	1972	Egypt (on order via Kuwait)
United Kingdom	Lightning	1959	Saudi Arabia (66)
Israel	Kfir (Modified, Mirage III) (Formerly called Barak)	1972	

<sup>b</sup>Source: Ref. 4.

<sup>c</sup>On order for delivery to Egypt.

<sup>d</sup>Source: Ref. 2.

<sup>e</sup>Source: Ref. 3.

<sup>f</sup>Parenthetical entries here and below show approximate total number of combat aircraft of all types.

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Table 8

INTRODUCTION OF GUIDED MISSILES<sup>a</sup>

(by year first obtained)

(% = "on order")

	SAM	Naval SSM	Ground SSM	Anti- tank	Air-to- Surface	Air-to- Air
Egypt	SA-2 (63) SA-3 (70) SA-6 (72) SA-4 (73) SA-7 (73) Rapier (X)	SS-N-2 (62)	Frog 3 (68) Samlet (68) Frog 7 (71) Scud (73)	AT-1 (63) AT-3 (63)	AS-1 (61) AS-5 (71)	K-13 (62) Magic (X) <sup>c</sup>
Iran	Hawk (64) Rapier (71)	Seacat (66) Sea Killer (71) Exocat (X) Harpoon (X)	SS-11 (70) SS-12 (70)	TOW (71) Swingfire (X)	Maverick (74) Harpoon (X) AS-12 (X)	Sidewinder (68) Sparrow III (68) Phoenix (X)
Iraq	SA-2 (62) SA-3 (72)	SS-N-2 (72)	—	SS-11 (X)	—	K-13 (63)
Israel	Hawk (63) Blowpipe (X) Redeye (X)	Gabriel (late 60's)	SS-10 (56) SS-11 (63) MD-660 (69) (Jericho) (Lance (X)	Cobra (62) Entac (63) Tow (73)	AS-30 (62) Bullpup (69) Shrike (70) Maverick (73)	R530 (66) Sparrow III (69) Sidewinder (73) Raphael Shafirir (late 60's)
Jordan	Tigercat (69) <sup>b</sup> Chaparral (X) Hawk (76)	—	—	TOW (74)	—	—
Saudi Arabia	Hawk (66) Thunderbird I (73) Crotale (X)	—	SS-11 (X)	Vigilant (64)	—	Firestreak or Redtop (X)
Syria	SA-2 (67) SA-3 (72) SA-7 (72) SA-6 (73)	SS-N-2 (66)	Frog 7 (73) Scud (74)	AT-1 (72) AT-3 (72)	—	K-13 (67)

<sup>a</sup>Source: SIPRI, *The Arms Trade Registers and World Armaments and Disarmaments—SIPRI Yearbook 1975*.<sup>b</sup>Entire system sold to South Africa in 1974.<sup>c</sup>Ordered by Kuwait for the Mirage F.1 aircraft previously ordered by Kuwait for Egypt.

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Table 9

SUPPLIERS/PRODUCERS OF TYPE-GUIDED MISSILES<sup>a</sup>

Supplier/Producer	Missile	Type	Range (km)	Year <sup>b</sup>
United States	Hawk	SAM	35	1959
	Chapparral	SAM	low altitude	1966
	Redeye	SAM	about 3	1964
	Harpoon	Naval SSM/ASM	110	1975
	Lance	Ground SSM	110	1966
	TOW	Antitank	3	1968
	Maverick	ASM	extended	1971
	Bullpup	ASM	11	1962
	Shrike	ASM	16	1964
	Sidewinder	AAM	3.4	1954
	Phoenix	AAM	126	1970
	Sparrow III	AAM	13	1958
France	Crotale	SAM	8	1972
	MM-38 Exocet	Naval SSM	37	1971
	SS-10	Ground SSM	1.5	1957
	SS-11	Ground SSM	3	1962
	SS-12	Ground SSM	6	1966
	MD-660?	Ground SSM	450?	1968?
	Entac	Antitank	2	1957
	AS-11	ASM	3	1962
	AS-12	ASM	6	1966
	AS-30	ASM	12	late 1950's
	R.530	AAM	18	1963-64
United Kingdom	Rapier	SAM	3	1967
	Thunderbird I	SAM	35	1960
	Blowpipe	SAM (also sub-launched)	?	1972
	Tigercat	SAM	4	1962
	Seacat	Naval SSM	4	1962
	Swingfire	Antitank	4	1969
	Vigilant	Antitank	1.6	1960
	Firestreak	AAM	1.2-8	1958
	Redtop	AAM	11	early 1960's
Italy	Sea Killer	Naval SSM	3-10	late 1960's
West Germany	Cobra 2000	Antitank	1.6	1960
USSR	SA-2	SAM	40	1957
	SA-3	SAM	25	?
	SA-4	SAM	24	1964
	SA-6	SAM	?	1967
	SA-7	SAM	3.5	?
	SS-N-2 "Styx"	Naval SSM	35	?
	"Frog-3"	Ground SSM	50	around 1960
	"Frog-7"	Ground SSM	7.5-92	around 1960
	"Samlet"	Ground SSM	90	1961
	SS-1C "Scud"	Ground SSM	150-300?	early 1960's
	AT-1 "Snapper"	Antitank	2.3	1964
	AT-3 "Sagger"	Antitank	2.3	1965
	AS-1 "Kennel"	ASM	90	1961
	AS-5 "Kelt"	ASM	320 <sup>c</sup>	1968
	K-13 "Atoll"	AAM	Similar to US Sidewinder	1956
Israel	Gabriel	Naval SSM	15-20	late 1960's
	Raphael Shafrir	AAM	?	late 1960's
	Jericho (MD-660)?	SSM	450?	1968-69?

<sup>a</sup>Source: SIPRI, The Arms Trade Registers.<sup>b</sup>Date on which production of first version started, first seen publicly, first delivery, etc. (i.e., first known info.).<sup>c</sup>Source: Jane's All the World's Aircraft 1973-74.

development has not reached this stage, but nuclear warheads could conceivably become available from the Soviet Union (Refs. 29, 30).

The possibility of indigenous production of missiles in the 300 mile or greater range class is surrounded by much public uncertainty in the case of both Israel and Egypt — the only two Middle Eastern countries known to have attempted such advanced levels of production. The Israeli armaments industry since 1972, if not earlier, has been producing the modified Mirage III/V design STOL fighter called the Kfir (formerly, Barak) and apparently is able to assemble or produce the Sabra medium tank with the 105mm British tank gun. (The production of this tank has probably been very low, however, possibly because of the ready availability of US and British tanks.) Similarly, Israeli industry is apparently able to produce the Jericho SS missile from a French and Israeli-modified design called the MD-660, rated at about 460 km. Some French and/or Israeli built Jerichos may be in Israeli stocks, but the production and deployment of this missile is highly uncertain. The most recent SIPRI and Jane's publications indicate it is not in production (Refs. 3, 4, 6).

In Egypt, even before Nasser's 1952 revolt, the government in the early years after World War II endeavored with the assistance of hired German technicians to develop both an aircraft industry and a surface-to-surface missile program. Both programs alternatively spurted and languished over the years. The aircraft industry had limited successes, but never succeeded in developing a sophisticated fighter and was terminated after the 1967 war. The initial objective of the Arab Military Industries Organization (AMIO) set up in 1975 by Egypt, Saudi Arabia, Qatar, and the United Arab Emirates is to produce a MACH-2 fighter -- renewing and upgrading the effort which was discontinued in 1967 to build the HA-300 (also called the Cairo-300) fighter (Ref. 35).

Egyptian attempts to build a surface-to-surface missile, begun under King Faruk, were stopped in 1952, revived in 1953, and cancelled again in 1956. A third attempt, again with West German scientists and technicians, was initiated in 1959 and produced prototypes of three missiles. These missiles were identified as Al Zafir, with a 1000 pound warhead and a 235 mile range; Al Kahir, with 1500 pound warhead and a 375 mile range; and Al Riad with a 2000 pound warhead (or scientific module) and a 440 mile range. Al Zafir was designed to be launched from a mobile platform. Enthusiastic claims were made for these missiles, but attempted launchings in the 1967 war were unsuccessful. The missile project was then reduced in priority. During the 1973 war, President Sadat reportedly stated that Al Zafir was ready to fly and could be directed against Israeli cities if the Israelis attacked Egyptian cities. In 1976, however, international analysts did not believe that any indigenous missiles were operational, but pointed to the Egyptian holdings of about 40-60 Soviet Scuds of approximately the same range as Al Zafir. (Syria also has a small number—about 30— of Scuds) (Refs. 2, 3, 6, 35).

Precision-guided air-to-ground, air-to-air, and air-defense missiles that have been introduced also represent a qualitative surge in Middle East arms procurement. Smaller forces—Saudi Arabia and potentially Jordan—have acquired the Hawk air defense missile, now also being extended to Kuwait. The introduction of relatively simple, mobile, and easy to use antitank missiles and surface-to-air missiles of US, Western Europe, and Soviet design has raised the technological level of infantry forces in several Middle Eastern countries and is likely to become general. Smaller states are likely to find such weapons particularly attractive as a substitute for the cost and difficulties of developing effective artillery and heavy missile systems.

### Naval Warships

Of the three services in Middle Eastern countries, naval developments and armaments have had lowest priority and have been notable only in Egypt, Israel, and Iran. Perhaps the most significant naval development in the series of Middle Eastern wars was the sinking of the Israeli destroyer Eilat on October 22, 1967 off Port Said by an Egyptian Komar-class (Soviet) missile boat with the Styx missile, the first combat use of such a missile in the history of warfare. This action demonstrated the effectiveness of these then-relatively new boats and naval missiles. It markedly influenced Israeli naval doctrine and the outlook of other states in the area who have sea coasts and corresponding requirements for naval or coast guard forces but no modern traditions of extended naval capability (see Tables 10 and 11).

In surface categories of the DE and DD class (no larger surface vessels have been acquired in the Middle East), only Israel, Egypt and Iran have had one or more units. Since 1971 or earlier, Israel has phased out its DD's, DE, and corvettes in order to concentrate on FAC's (fast attack craft) with a variety of missile, cannon, and torpedo armament, and submarines -- three more of the latter being on order. Egypt has retained, but not increased, its destroyer and frigate units, expanded the corvette holdings, decreased submarine (because of aging) units, and currently shows a decrease in FAC units, with no known orders. Only Iran, possibly with visions of imperial grandeur, has continued to favor the larger surface categories by ordering four of the new US Spruance class DD's to add to its 4-DE's and 3 DD's. Rather interestingly, Iran until the present has had no submarine or FAC holdings, but has now placed orders for three and twelve respectively.

Elsewhere, naval holdings are negligible. Iraq and Syria are dependent on the FAC category. Saudi Arabia, with no navy at all, is endeavoring to develop an initial coast guard capability with FAC's and smaller craft. In the Arab-Israeli confrontation, the naval warships

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Table 10  
DISTRIBUTION OF MAJOR NAVAL WARSHIPS<sup>a,c</sup>

Country	Type	1965-66	1970-71	1975-76	On order
Egypt	Destroyer (DD)	6	6	5	
	Frigate (DE)	4	4	3	
	Corvette (Corv)	2	2	12	
	Submarine (SS)	9	16	12	
	Fast Attack				
	Craft-Missile (FAC-M)	3	20	12	
	Fast Attack				
Iran	Craft-Torpedo (FAC-T)	36	45	36	
	DD		1	3	4
	DE	1	5	4	
	Corv	3	5	4	
	SS				3 <sup>b</sup>
	FAC-M				12
Iraq	FAC-T				
	DD				
	DE				
	Corv			3	
	SS				
	FAC-M			6	
Israel	FAC-T	12	12	12	
	DD	2	2		
	DE	1			
	Corv	4			
	SS		3	2	3
	FAC-M		12	18	6
Saudi Arabia	FAC-T	12	9	6 <sup>b</sup>	
	DD				
	DE				
	Corv				
	SS				
	FAC-M				
Syria	FAC-T		1	3	6 <sup>b</sup>
	DD				
	DE				
	Corv				
	SS				
	FAC-M	6	6	12	
	FAC-T	15	17	16	

<sup>a</sup>Source: Jane's Fighting Ships 1965-66, 1970-71, 1975-76 (Ref. 6).  
Refer to Table 11 for warship characteristics, suppliers, recipients.

<sup>b</sup>Source: IISS, The Military Balance 1975-76 (Ref. 2).

<sup>c</sup>Jordan has only 12 small patrol craft, no significant combat potential.

Table 11

SUPPLIERS, RECIPIENTS, CHARACTERISTICS OF MAJOR  
NAVAL WARSHIPS IN THE MIDDLE EAST<sup>a</sup>

Supplier/ Recipient	Class	Std dis- placement (tons)	Date <sup>b</sup>	Main Armament <sup>c</sup>
<u>Destroyers</u>				
USSR/Egypt	"Skory"	1030	1951	2-twin 5.1 in guns, 1-twin 3.4 in gun, 10 torpedo tubes
UK/Egypt	"Z"	1730	1944(64)	4-4.5 in guns
UK/Iran	"Battle"	2325	1946(69)	1-quad Seacat SAM launcher, 2-twin 4.5 in guns
USA/Iran	"Sumner"	2200	1945(71)	4-Standard SAM launchers, 2-twin 5 in guns, 2-triple torpedo launchers
USA/Iran	"Spruance"	7800 (full load)	1978	1-Sea Sparrow SAM multiple launcher, 2-5 in guns, 1-Asroc ASW missile 8-barrel launcher, 2-triple torpedo launchers
<u>Frigates</u>				
UK/Egypt	"Black Swan"	1490	1943	6-4 in guns
UK/Egypt	"River"	1490	1942(50)	1-4 in gun
UK/Egypt/ Israel	"Hunt"	1000	1940(51)	4-4 in guns
UK/Egypt	"Flower"	1060	1940	1-4 in gun
UK/Iran	"Loch"	1650	1945	2-4 in guns
UK/Iran	"Saam"	1110	1969	1-quint Seakiller SSM launcher, 1-triple Seacat SAM launcher, 1-4.5 in gun
<u>Submarines</u>				
USSR/Egypt	"R"	1100	1958-61	6-torpedo tubes
USSR/Egypt	"W"	1030	1951-57	6-torpedo tubes
USSR/Egypt	"MV"	350	1950	2-torpedo tubes
UK/Israel	"T"	1280	1944-45(64)	6-torpedo tubes
UK/Israel	"S"	715	1945(60)	6-torpedo tubes
UK/Israel	"Type 206"	420	1976	8-torpedo tubes
USA/Iran	"Tang"	2100	1952(60s)	8-torpedo tubes

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Table 11 (contd)

Supplier/ Recipient	Class	Std dis- placement (tons)	Date <sup>b</sup>	Main Armament <sup>c</sup>
<u>Corvettes</u>				
UK/Egypt	"Bangor"	672	1941	1-4 in gun, 1-3 in gun
UK/Iran	"Algerine"	1040	1942	2-4 in guns
USSR/Egypt, Iraq	"SOI" subchasers	215	1957+	4-5 barrel ASW rocket launchers
USA/Iran	"PF"	900	1964-69	2-3 in guns
<u>Fast Attack Craft - Missile</u>				
USSR/Egypt, Iraq, Syria	"OSA"	165	1959+	2-twin SS-N-2 "Styx" SSM launchers
USSR/Egypt, Syria	"Komar"	70	1961+	2-SS-N-2 "Styx" SSM launchers
France/Israel	"Saar"	220	1969	8-Gabriel SSM launchers 2-torpedo tubes
France/Iran	"La Combattante II"	234	1975	4-MM-38 Exocet launchers
Israel	"Saar IV"	415	1973	7-Gabriel SSM launchers
<u>Fast Attack Craft - Torpedo</u>				
USSR/Egypt	"Shershen"	150	1959+	4-torpedo tubes
USSR/Egypt, Iraq	"P6"	66	1951-60	2-torpedo tubes
USSR/Syria	"P4"	25	1951-58	2-torpedo tubes
USSR/Egypt	"PA"	50	1956-58	2-torpedo tubes
UK/Egypt	"D"	100	WWII	4-torpedo tubes
Yugoslavia/ Egypt	-	56	1942	2-torpedo tubes
Germany/ Saudi Arabia	"Jaguar"	160	1969	4-torpedo tubes

<sup>a</sup>Ref. 6. Other vessels generally maintained by these countries include various size patrol boats, minesweepers, etc.

<sup>b</sup>Date construction originally completed. Parenthetical entries show date of overhaul or refitting, if any.

<sup>c</sup>Most ships generally mount additional anti-aircraft guns and anti-sub depth charge equipment.

of present and future significance are the submarines and the FAC. Only Israel and Egypt have both capabilities, Egypt having the advantage in numbers. Israel, however, is now producing its own missile boats of the SAAR IV type - a modification of a French design. In the Persian Gulf, the Iranian navy is completely dominant, with no other significant forces closer than Pakistan and India on the Arabian Sea.

#### CONCLUSIONS

The expansion of forces, quality of arms, and growth of capability in their use is general in the Middle East, but at differing levels depending on the overall stage of development of the various countries. The principal focus is on the confrontation states involved in the Arab-Israeli conflict, where military-technological capabilities are so high and political tensions so severe as to endanger not only the peace of the region but of the world. The trend toward qualitative improvement in weapons of all kinds is probably irreversible, but a limitation or leveling-off in the categories of long-range, high capacity weapons is a matter of urgency. Both sides will require an assurance of balance, which (for each) will consist of some combination of weapons parity, weapons numbers, and political and economic assurances seen to be satisfactory in terms of survival and at least minimally satisfactory in moving toward national goals. To achieve this, coordinated action by the major arms suppliers appears to be required (Ref. 32).

Outside the context of the Arab-Israeli Conflict, a question would appear to be raised by the enormous military outlays being made by Iran. The question is - "Why?" Does Iran fear Iraq or Saudi Arabia (unlikely)? Or is it India? Has the Iranian estimate of military needs been critically reviewed by the US, as major supplier, or has it been accepted for the double-barreled reason of arms sales profits and belief that, if the US does not make the sales, Iran can easily find other suppliers? One can only assume that the vast scale of supply to Iran has been judged to serve US interests in the global context (Ref. 36).

Finally, although there can be little doubt that the weapons most needful of constraint are those of long-range, high technology, and high offensive capacity, the example of the Egyptian air defense in 1973 can be adduced as evidence that even those weapons most clearly defensive in themselves may nevertheless be an essential element and precondition of offensive operations. Without the cover of this air defense, the cross-canal assault would -- by comparison -- have suffered seriously, would have been at high risk, and might not have succeeded. The classification of weapons as "defensive" or "offensive," and the relating of these classifications to the words "stabilizing" and "destabilizing" can provide only partial and approximate guidance for arms constraints. The desirability of stabilization itself may vary from different points of

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view. The Egyptian-Israeli situation in 1972 and early 1973 was an apparently stable one of diplomatic and military inaction. The "no peace, no war" stagnation, however, was internally destabilizing and politically unbearable for Egypt. The October 1973 war was launched to alter the situation, and the Egyptian public supported this course.

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Appendix C

ARMS COMPETITION IN LATIN AMERICA

Michael V. McClary

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## ARMS COMPETITION IN LATIN AMERICA

## PURPOSE AND SCOPE

The purposes of this appendix are to describe general trends in arms competition in Latin America, to discuss the military, political, and economic factors that influence patterns of competition among the principal actors, and to examine the potential utility of possible constraints on the qualitative aspects of conventional armaments competitions. In the Latin American context, the treaty of Tlatelolco (February 1967) appears to have excluded nuclear weapons from the region, so that arms competition occurs principally in the conventional arena. For the purposes of statistical comparison in this appendix, only the major categories of conventional weapons are included: tanks, sophisticated jet fighters, warships (carriers, cruisers, destroyers, frigates, and submarines), and guided missiles. These four categories are representative of the kinds of major weapons systems being acquired and may thus illustrate trends in quantitative and qualitative aspects of arms and force levels.

Latin America as a region generally describes all the nations and territories in the Western hemisphere south of the United States. For the purposes of this appendix, the focus of interest will be on the six principal states in South America: Argentina, Brazil, Chile, Colombia, Peru, and Venezuela. There are several reasons for this. One, of course, is to enable meaningful comparisons by using a manageable portion of a wealth of data. More importantly, as Table 1 illustrates, these six, with Mexico and Cuba, account for approximately 78 percent of the region's GNP, 84 percent of the population, 93 percent of military expenditures, 88 percent of all the arms imported in the period 1963-1973, and almost 87 percent of the region's armed forces. Mexico, although the second richest nation in Latin America, has chosen to maintain relatively modest levels of organization and expenditures for the armed forces. In 1973 only 0.7 percent of its gross national product was devoted to military expenditures, one of the lowest in the world. Cuba, the other important military power in the Caribbean, is almost totally dependent on the USSR not only for the maintenance of its armed forces, but also for the well-being of its entire economy. Due to its proximity to the US, and the nature of the US/Cuban relation, the overt military threat to the rest of the hemisphere is negligible. With these two nations (Mexico and Cuba) excluded, the "big six" accounted for almost three-fourths of the arms imported during the period 1964-1973. From a comparison of various data we may be able to draw some general conclusions as to the nature and characteristics of arms competition in Latin America. Because there is a myriad of data, we must carefully choose those which seem most relevant.

Table 1  
COMPARATIVE ECONOMIC-MILITARY AND POPULATION DATA FOR  
PRINCIPAL NATIONS IN LATIN AMERICA<sup>a</sup>

	Gross National Product 1973 (billions of dollars)	Population 1973 (millions)	Military Expenditures 1973 (billions of dollars)	Arms Imports 1964-1973 (billions of dollars)	Armed Forces 1973 (Thousands)	Relative Burden 1973
Total Latin America	222.66 <sup>b</sup>	301.55	3.1859 <sup>b</sup>	2.323	1211	1.32
a. Argentina	28.56	25.100	0.4169 <sup>c</sup>	0.312	160	1.53 <sup>c</sup>
b. Brazil	55.48	103.000	1.1878	0.448	420	2.14
c. Chile	7.54	9.523	0.1332	0.157	75	1.77
d. Colombia	8.78	24.100	0.0879	0.173	50	1.00
e. Peru	8.05	14.700	0.2288	0.360	75	2.84
f. Venezuela	15.34	11.890	0.2691	0.259	50	1.75
Total (a thru f)	123.75	188.313	2.3237	1.709	830	--
Percent of Latin America	55.58	62.44	72.94	73.57	68.54	--
b. Cuba	6.26 <sup>c</sup>	8.851	0.3190 <sup>c</sup>	0.311	140	5.09 <sup>c</sup>
h. Mexico	43.27	55.900	0.3017	0.030	80	0.70
Total (a thru h)	173.28 <sup>b</sup>	253.064	2.9444 <sup>b</sup>	2.050	1050	--
Percent of Latin America	77.82	83.92	92.42	88.25	86.71	--

<sup>a</sup>Source: Reference 1, all dollar amounts are expressed in terms of constant 1972 dollars, allowing for inflation.

<sup>b</sup>Includes 1972 data for Argentina and Cuba, as 1973 data was not available.

<sup>c</sup>1972 data (1973 data not available).

<sup>d</sup>Current dollars (1973).

Levels of military expenditure include most if not all resources that are devoted to the arms acquisition process in developing nations. Data available concerning the international arms trade which include grant and credit as well as commercial sales are further indicators of the importance that a nation gives to military preparedness. A look at the population, gross national product, and size of the armed forces is also useful in forming a general picture of each nation with respect to the others. A primary indicator is what has been called "relative burden," the military expenditures as a percentage of the gross national product:

As differences in the relative wealth of countries become wider, the ratio to GNP becomes less valid for intercountry comparisons. Poorer countries tend to devote a larger share of their income to consumption. At the same time, they have a more urgent need for rapid economic growth, which requires resources for investment. In these countries, therefore, any diversion of resources to military programs represents a heavier burden than it does in the wealthier countries. At the same time, technical training of military personnel contributes to the civilian labor forces and to development of the poorer countries (Ref. 1, p. 12).

Also useful are comparisons of gross national product per capita and military expenditure per capita and rates of change over the years for all these factors. The ratio of military expenditure to armed forces may indicate to a degree the relative sophistication of the armed forces, while armed forces per capita may suggest the importance the armed forces play in the society. Additionally, one must investigate the actual makeup of arms imports during the period both from quantitative and qualitative points of view as well as frequency of imports. As mentioned earlier, this area will be limited to four major types of weapons systems. Other factors that bear on the problem include each nation's capability to conduct research and development as well as to produce weapons.

The diversity of the above kinds of data suggests the difficulties involved in trying to assess arms competition. These data are available in many sources. The bibliography lists many works which provide information not only from a statistical point of view but also in terms of a more theoretical discussion of arms competition. Statistical data used in this appendix come from three principal sources: World Military Expenditures and Arms Trade 1963-1973, published by the Arms Control and Disarmament Agency (ACDA); The Military Balance, published annually by the International Institute for Strategic Studies (IISS); and the publications of the Stockholm International Peace Research Institute (SIPRI),

most notably the annual World Armaments and Disarmament yearbooks, and The Arms Trade with the Third World.\*

Problems of accuracy develop not only because of differing classified and unclassified sources, but also because of differing definitions of the various indicators such as GNP, size of the armed forces (e.g., whether or not to include paramilitary forces), and the makeup of military expenditures. Few data are available on the percent that military expenditures are of the total government budget. Data are often contradictory on the composition of the arms imports during a year, and few are available on older pieces of equipment presumably replaced by more recent imports of higher quality. Another uncertainty is introduced by the economies of the various nations. Argentina is a particularly apt example with its economic as well as political turbulence of recent years. For example, the 1975 issue of The Military Balance, while providing figures for GNP and the defense budget, warns that rapid inflation makes them unreliable (Ref. 2, p. 62). At best, by comparing the various data available, we may detect a general pattern or picture of the arms competition in Latin America, keeping in mind the problems inherent in attempting to quantify such a complicated process, especially with regard to varying definitions, economies, availability of accurate statistical data, and the interrelationships of the political, military, and economic sectors of each national society.

The data examined cover primarily the period 1963-1973, although more recent information is introduced where available. It is difficult to project or predict the nature of trends in competition during the next 10 years. Possibly the annual rates of change in the past will give some idea. Much depends on the political atmosphere during the next decade both within each nation as well as among the various nations.

Arms competition in Latin America must be viewed in perspective. In comparison with the rest of the world, Latin America has shown a marked stability in arms competition. In his 1967 study for the Senate Foreign Relations Committee, Professor Edwin Lieuwen observed that, "in terms of both force levels and military expenditures Latin America has the smallest defense establishment of any region in the world" (Ref. 3, p. 15). This observation was supported by SIPRI's 1971 summary of Latin American military expenditures as one percent of world military expenditures, ten percent of the military expenditure of developing nations, and three percent of total US aid (Ref. 4, p. 685). Table 2 presents a comparison of several of these indicators between Latin American nations and other regions and countries.

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\*As ACDA has available to it classified as well as unclassified data, its statistics are probably more accurate than those of the other two, although they are important sources of information concerning the composition of the trade and must not be discounted or disregarded.

Table 2  
SELECTED COMPARISONS OF MILITARY INDICATORS FOR  
LATIN AMERICA WITH OTHER STATES AND REGIONS

Country or Region	GDP (\$ billions)		MILEX (\$ billions)		Relative Burden (%)		HILEX/Capita (\$)		GNP/Capita (\$)		Arms Imports (\$ millions)		Population (millions)		Armed Forces (thousands)		MILEX/Armed Forces (\$)		Armed Forces/ 1000 people	
	1973	Growth <sup>b</sup>	1973	Growth	1973	Growth	1973	Growth	1973	Growth	1973	Growth <sup>d</sup>	1973	Growth	1973	Growth	1973	Growth	1973	Growth
World	4347.5	5.1	241.71	2.6	5.64	-2.4	61.81	0.5	1112	2.9	8719.3	400.15	3910.59	2.1	25549	2.2	9461	0.4	6.53	0.1
Developed	3617.9	4.9	208.83	2.0	5.64	-3.2	205.32	1.0	3561	3.9	1419.4	-56.18	1016.11	1.0	9877	0.1	21143	1.9	9.72	-0.9
Developing	729.6	5.8	32.88	7.2	5.62	2.6	11.36	4.6	232	3.2	7299.8	456.32	2894.49	2.5	15672	3.8	2098	3.3	5.41	1.3
Latin America	187.1	5.7	2.45	3.9	1.32	-1.6	8.11	1.1	620	2.8	450.7	25.83	301.55	2.8	1211	2.2	2020	1.7	4.02	-0.6
Africa	79.0	6.4	2.16 <sup>c</sup>	6.5	2.82 <sup>c</sup>	6.4	6.84 <sup>c</sup>	3.0	244	2.9	322.9	13.64	324.13	3.4	935	9.0	2274 <sup>c</sup>	-2.3	2.88	5.3
Near East	46.2	6.7	6.03 <sup>c</sup>	14.7	11.94 <sup>c</sup>	10.7	56.03 <sup>c</sup>	11.3	417	3.5	367.1	223.06	110.77	3.0	1283	6.7	4829 <sup>c</sup>	7.5	11.58	3.6
South Asia	76.1	3.4	2.36	2.9	3.48	0.3	2.99	0.6	96	1.1	371.2	-3.12	788.69	2.3	2318	4.0	1018	-1.0	2.94	1.7
Argentina	28.56	4.8	0.4166 <sup>c</sup>	1.0	1.53 <sup>c</sup>	-3.6	16.81 <sup>c</sup>	-0.5	1138	3.3	42.6	5.28	25.100	1.5	160	-0.7	2978 <sup>c</sup>	2.3	6.37	-2.2
Brazil	55.48	7.7	1.1878	9.8	2.14	1.9	11.53	6.8	539	4.7	109.8	6.69	103.000	2.8	420	3.2	2828	6.3	4.08	0.4
Chile	7.54	3.8	0.1332	2.0	1.77	-1.8	13.98	0.1	792	1.9	24.6	1.28	9.523	1.9	75	0.4	1776	1.6	7.88	-1.6
Colombia	8.78	5.6	0.0879	3.5	1.00	-2.0	3.65	0.3	364	2.3	37.9	2.46	24.100	3.2	50	-0.5	1759	4.1	2.07	-3.7
Pero	8.05	4.3	0.2288	6.2	2.84	1.8	15.56	3.1	568	1.3	72.9	6.95	14.700	3.0	75	1.4	3050	4.7	5.10	-1.5
Venezuela	15.34	5.1	0.2691	4.6	1.75	-0.5	22.63	1.3	1290	1.8	87.1	5.82	11.890	3.2	50	2.0	5381	2.5	4.21	-1.2
Zaire	2.50	3.8	0.1002 <sup>c</sup>	12.5	4.21 <sup>c</sup>	6.3	5.42 <sup>c</sup>	10.0	132	3.4	4.7	0.02	18.900	2.3	65	9.8	222 <sup>c</sup>	3.4	3.44	7.4
S. Africa	20.36	5.5	0.3052	3.2	2.46	-0.3	21.41	2.5	863	2.8	20.8	-0.90	23.600	2.7	40	0.9	12430	4.3	1.69	-1.8
India	60.65	3.1	1.8907	2.2	3.12	-0.9	3.13	-0.0	101	0.9	170.4	-5.16	403.300	2.2	1620	3.8	1167	-1.5	2.69	1.5
France	212.26	5.7	7.1766	0.6	3.62	-4.5	138.01	-0.3	4082	4.8	14.2	-8.63	52.000	0.8	560	-2.1	12815	2.8	10.77	-3.0
USA	1294.90	3.9	74.2976	1.0	6.06	-2.7	353.13	-0.0	5829	2.8	161.9	8.67	210.400	1.1	2253	-1.3	32977	2.3	10.71	-2.3

<sup>a</sup>Data adapted from Ref. 1, all dollar amounts are expressed in terms of constant 1972 dollars, allowing for inflation.

<sup>b</sup>Percent annual growth rates for the period 1963-1972 (all "growth" columns except "arms imports"—see note d).

<sup>c</sup>1972 data (1973 data not available).

<sup>d</sup>Average annual growth in arms imports in millions of dollars.

## GENERAL TRENDS

This section presents data concerning military expenditures, relative burden, and arms imports during the period 1963-1973. Force levels in terms of tanks, jet fighters, warships, and missiles during the period 1963-1975 are also presented. Relationships among the six nations in terms of economic and military strengths using the latest (1973 and 1975) data are examined. The purpose behind the presentation of such a wide variety of information is to examine trends in military spending and arms imports in order to discover patterns of competition, both quantitatively and qualitatively, which may exist among Argentina, Brazil, Chile, Colombia, Peru, and Venezuela. These patterns, coupled with information available concerning projected arms imports, may enable us to draw some tentative conclusions as to prospects for the future.

Table 3 shows the six nations' military expenditures from 1963 through 1973 in terms of constant 1972 millions of dollars. The most significant increase in spending occurred in Brazil in 1964. This may very well have been a reaction prior to and following the toppling of President Goulart's anti-military regime by Brazil's armed forces. Also significant when considering Brazil's high average annual growth rate is the fact that this period has seen a tremendous improvement in the country's economy. Peru's comparatively high growth rate may reflect her attempt to expand her evolving role as the leader among the nations of the Andean group.

Table 4 shows the relative burden over the years in each nation. There is no really discernible pattern except that in all nations in recent years the proportion of military spending to gross national product has been decreasing, although the average growth rates for Brazil and Peru, who also have the largest burdens, are positive.

The amounts shown in Table 5, arms imports during the period 1963-1973, may be only partially accounted for under the resources devoted to military expenditures—these figures include grant aid as well as credit sales. Also the imports of Argentina and Brazil might be higher were it not for their infant but growing defense industries—to be discussed later. Brazil is by far the largest importer, followed by Peru, Argentina, and Venezuela. Spending within individual nations does not seem to show a particular pattern, except for Brazil, which has shown a fairly consistent pattern of growth. This may be an indication of a more advanced and sophisticated fiscal policy, reflecting a more stable society and more sophisticated, professional armed forces. While Tables 6-9 are concerned only with tanks, jet fighters, warships, and missiles, the figures in Table 5 include all categories of weapons and systems including spare parts, small arms, military electronic and communications equipment, uniforms, ammunition, etc. Therefore, direct

Table 3

MILITARY EXPENDITURES<sup>a</sup>  
(Millions of 1972 constant dollars)

Year	Argentina	Brazil	Chile	Colombia	Peru	Venezuela
1963	397	390	127	81	143	173
1964	417	726	116	85	160	183
1965	401	664	126	93	166	211
1966	452	763	146	96	161	216
1967	429	835	134	88	216	244
1968	435	820	145	96	245	234
1969	457	911	142	88	210	230
1970	486	1121	156	102	259	238
1971	431	1174	179	202	275	297
1972	416	1240	138	109	252	270
1973	na <sup>b</sup>	1187	133	87	228	269
Growth (Pct. Ann.)	1.0	9.8	2.0	3.5	6.2	4.6

<sup>a</sup>Source: Ref. 1, pp. 21, 23, 26, 27, 51, 62.

<sup>b</sup>Not available.

Table 4

RELATIVE BURDEN<sup>a</sup>

(Percentage ratio of military expenditures to GNP)

Year	Argentina	Brazil	Chile	Colombia	Peru	Venezuela
1963	2.30	1.44	2.33	1.61	2.84	1.92
1964	2.19	2.61	2.06	1.60	2.95	1.89
1965	1.93	2.33	2.13	1.68	2.91	2.05
1966	2.18	2.55	2.32	1.65	2.67	2.04
1967	2.02	2.66	2.10	1.46	3.49	2.20
1968	1.96	2.39	2.19	1.49	3.97	2.02
1969	1.89	2.44	2.08	1.29	3.31	1.70
1970	1.93	2.74	2.18	1.42	3.81	1.83
1971	1.65	2.58	2.29	2.63	3.80	2.21
1972	1.53	2.47	1.73	1.33	3.31	1.91
1973	na <sup>b</sup>	2.14	1.77	1.00	2.84	1.75
Growth rate, (%/yr)	-3.6	1.9	-1.8	-2.00	1.8	-.5

<sup>a</sup>Source: Reference 1, pp. 21, 23, 26, 27, 51, 62.<sup>b</sup>Not available.

Table 5  
 THE ARMS TRADE (IMPORTS) 1963-1973<sup>a</sup>  
 (Millions of 1972 constant dollars)

Year	Argentina	Brazil	Chile	Columbia	Peru	Venezuela
1963	6.8	19.1	10.9	9.5	13.6	10.9
1964	5.4	20.1	12.1	8.1	8.1	6.7
1965	9.2	21.1	4.0	5.3	6.6	4.0
1966	9.0	15.4	18.0	14.1	16.7	9.0
1967	7.5	42.2	9.9	7.5	11.2	12.4
1968	22.7	51.4	21.5	17.9	35.8	3.6
1969	53.6	59.3	6.8	16.0	28.5	3.4
1970	25.9	22.7	11.9	11.9	25.9	3.2
1971	14.5	52.7	27.9	3.1	54.8	20.7
1972	82.0	59.0	16.0	41.0	80.0	64.0
1973	42.6	109.8	24.6	37.9	72.9	87.1
Cumulative	279.2	472.8	163.6	172.3	354.1	225.0
Average annual growth	5.28	6.69	1.28	2.46	6.95	5.82

<sup>a</sup>Source: Reference 1, pp. 79, 81, 84, 85, 109, 120.

correlations between military expenditures, arms imports, and the actual increase or decrease in the four categories in Tables 6-9 may not always occur. It is interesting to compare the cumulative totals of these six nations' imports with those of the other two major powers in Latin America—Cuba with \$311 million in imports, almost entirely supplied by the Soviet Union, and Mexico with \$30 million in imports.

Table 6 shows the number of tanks appearing in the six nations from 1963 through 1975 from the information available. Data prior to 1970 was obtained from The Arms Trade Registers published by SIPRI. Most of the data from 1970 through 1975 were obtained from annual issues of IISS's The Military Balance, supplemented in certain instances with SIPRI data (marked with an asterisk). The tank category is broken down into light and medium types. Qualitative distinctions were generalized into A, B, and C classes. An "A" class light tank might be a Soviet PT-76 (vintage 1955) or a newer, modern American M-551 Sheridan (though some American armor men might question its being classified as a tank!). Neither of these vehicles appears in South America. The "B" class would include the American M-41 or the French AMX-13, while the "C" class includes the old World War II vehicles such as the M-5 and M-24. Class A medium tanks include the French AMX-30 and the Soviet T-55. Examples of Class B medium tanks might be the American M-47 or the Soviet T-54. Class C, again, are the Second World War vintage tanks such as the M-4 Sherman, the M-26, and the Soviet T-34. (There are inconsistencies in the data; for instance, SIPRI shows that Brazil imported 20 M-47 Patton tanks in 1965. The Military Balance 1972-73 shows 40, but in later editions the vehicles do not appear at all.) Chile's receipt of 30 AMX-13's in 1964 may have been spurred by Peru's preponderant armored strength. Brazil's increases in 1965 and 1966 may have been part of the reaction that set in after the military take-over in 1964. The striking changes in this particular table occurred when Venezuela appears with a substantial number of Class A AMX-30 tanks in 1972, and as Peru began receiving the first of 200 T-55 Soviet tanks in 1973, which may have partially encouraged Brazil to double the size of its light tank forces in 1974. Again, however, it must be emphasized that data concerning arms transfers are sketchy at best and hard-and-fast comparisons must be avoided. Still, the information is valuable in enabling us to make some comparisons.

Table 7 is organized along lines similar to Table 6, and is limited to what SIPRI refers to as trans-sonic and supersonic "sophisticated" aircraft. As applying to Latin America, these jet fighters are again, somewhat arbitrarily, broken down into three qualitative classes: A—The American F5E Tiger II (specifically designed for the air forces of developing nations—the "poor man's fighter"), and the Canadian model, the CF5A; B—the Mirage III and Mirage V French jet fighters; and, C—the American A4 Skyhawk, the British Hawker Hunter, and the

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Table 6  
 LIGHT AND MEDIUM TANKS<sup>a</sup>  
 (Numbers by year and class<sup>b</sup>)

Year	Class	Argentina	Brazil	Chile	Colombia	Peru	Venezuela
1963 <sup>c</sup>	Lt Med	75C	50B, 50C 50C	10C 30C	5C	40B, 10C 60C	20B, 10C
1964	Lt Med			+30B			
1965	Lt Med		+20B				
1966	Lt Med	+5B	+55B				
1967	Lt Med						
1968	Lt Med						
1969	Lt Med	+60B				+78B	
1970	Lt Med	60B ?C <sup>d</sup>	100B			100B 60C	?B
1971	Lt Med	?C					?B
1972	Lt Med	90B ?C	100B 4A*, 40B, 150C	?C 76C	?C	100B 60C	142A <sup>*</sup>
1973	Lt Med	120B 120C	100B 40B, 150C	10C 76C		100B 22A*, 60C	15B 16A
1974	Lt Med	120B 120C	200B 150C	60B, 10C 76C	?C ?C	100B 200A, 60C	15B 16A
1975	Lt Med	120B 120C	200B 150C	60B, 10C 76C	?C ?C	100B 200A, 60C	40B 120A

Table 6 (continued)

<sup>a</sup>Sources: References 5, pp. 103-123 and 2, pp. 62-67, 93  
(and preceding issues.)

	<u>Lt tanks</u>	<u>Med tanks</u>
<sup>b</sup> Class A:	(none in Latin America)	French AMX-30, Soviet T-55
Class B:	US M-41, French AMX-13	US M-47
Class C:	US M-5 and M-24	US M-4 Sherman, M-26

<sup>c</sup>Total tank imports through 1963 according to SIPRI. Figures through 1969 reflect additions to these totals. Figures after 1969 represent total current inventories each year according to IISS.

<sup>d</sup>Question mark indicates that a class of vehicle is held, but the number is not given or available according to IISS.

\*Source: Reference 5, pp. 102-123. Data of IISS and SIPRI are not easily comparable, nor are data presented from year to year. At best, only general levels and trends are obtainable from this table.

Table 7

SOPHISTICATED AIRCRAFT<sup>a</sup>  
(numbers by year and class<sup>b</sup>)

	Argentina	Brazil	Chile	Colombia	Peru	Venezuela
1963 <sup>c</sup>	28 F-86	20 F-80C	20 F-80C	6 F-86	20 F-86, 10 F-80C	22 F-86
1964						
1965						
1966	+12C					
1967	+13C					
1968					+14B	
1969						
1970	25C(+25C*)		25C		14B	
1971						
1972	47C(+16C*)	15C(+16B*)	18C	18B	14B	16A
1973	14B, 47C	16B, 15C	18C	16B	14B	18A
1974	14B, 47C	16B, 15C	32C	16B	14B	20A
1975	14B, 47C	16B, 80C	32C	16B	14B	20A, 15B
On order		42A*	18A, 36C	?A	24A, 8B, 24C	?A, 15B

<sup>a</sup>Sources: Refs. 5, pp. 103-123 and 2, pp. 62-67, 93 (and preceding issues).

<sup>b</sup>Class A: US F-5E Tiger II, Canadian CF-5A (version of US F-5A Freedom Fighter).

Class B: French Mirage III and Mirage 5.

Class C: US A-4 Skyhawk, Brazilian AT-26 Xavante, British F-71 Hawker Hunter.

<sup>c</sup>Older subsonic jet fighter aircraft delivered through 1963 according to SIPRI. Figures through 1969 reflect additions to these totals. Figures after 1969 represent total current inventories each year of modern sophisticated aircraft according to IISS.

<sup>d</sup>Class of aircraft is on order but number is not available.

\*Source: Ref. 5, pp. 103-123. Data of IISS and SIPRI are not easily comparable, nor are data presented from year to year. At best, only general levels and trends are obtainable from this table.

newer subsonic counterinsurgency ground attack aircraft, the Brazil/Italy AT-26 Xavante and the US A37B. In 1963, all six of the countries were armed with the older American fighters such as the F80C Shooting Star and the F86 Sabre. Levels stayed fairly constant although Argentina obtained the A4 in 1966-1967 and Peru supplemented her older aircraft with the Mirage III. In 1972, the other nations, except Chile, also began replacing their old inventories, primarily with the Class B French Mirage. Significantly, Venezuela was the first to obtain a Class A capability, with the Canadian version of the F5A Freedom Fighter, in 1972. Currently, all others except Argentina have ordered a Class A capability.

Table 8 reflects levels of warship strength from 1963 through 1975. For our purposes, warships include aircraft carriers (CV), light cruisers (C), destroyers (DD), frigates or destroyer escorts (DE), and submarines (SS). Most of the countries' inventories are composed of World War II and early fifties' vintage warships originating in the US or UK, especially in the DD and SS classes. The 1960's saw Argentina, Chile, Brazil, and Venezuela upgrade and modernize their fleets primarily through the addition of the Seacat surface-to-surface missile system to destroyer forces (Argentina mounts hers on one of her light cruisers). Between 1969 and 1971 Brazil, Argentina, and Colombia increased the size of their destroyer forces. Also in 1971, Argentina, Brazil, and Chile—three nations with strong naval traditions—began significantly upgrading their navies by ordering new construction. Peru and Venezuela followed this lead in 1975. Primary emphasis has been given to the British Type 42 guided missile destroyer, the "Leander" and "Nitheroi" class frigates, and the German Type 209 and UK "Oberon" class submarines, among others. Although not included in the warship category, several nations, most notably Venezuela, have ordered missile-firing fast patrol boats.

As late as 1971, authorities were pointing out the virtual lack of missiles in South America. This situation has undergone a drastic change, as is indicated in Table 9. At the present time, all nations except Colombia have the Seacat (range 4 km), the Exocet (range 37 km), or the Otomat (range 60-80 km) surface-to-surface naval missiles. Brazil has ordered the Australian Ikara (range 20 km), an antisubmarine guided missile with a homing torpedo, and Argentina has ordered the Israeli Gabriel SSM (range 15-20 km) and the British Seadart SAM (range 27-36 km). Argentina, Brazil, and Chile have on hand or have ordered tactical guided missiles of the surface-to-surface and air-to-surface varieties including antitank guided missiles. The air forces of Argentina, Brazil, and Venezuela are armed, in part, with the Sidewinder or French Matra R.530 air-to-air missiles. Brazil has obtained the German/French Roland surface-to-air missile (range 6 km) and The Military Balance holds that country with the longer range American Hawk as well.

Table 8  
WARSHIPS<sup>a</sup>  
(Number by type<sup>b</sup> and year)

	Argentina	Brazil	Chile	Colombia	Peru	Venezuela
CV	1	1	—	—	—	—
C	3	2	2	—	2	—
1963 DD	9	13	4	3	2	3
DE	4	8	2	2	5	6
SS	2	4	2	—	4	1
CV	1	1	—	—	—	—
C	3*	2	2	—	2	—
1965 DD	9	12	4*	3	2	3
DE	4	7	2	2	5	6
SS	2	4	2	—	4	2
CV	1	1	—	—	—	—
C	3	2	2	—	2	—
1967 DD	9	10*	4	3	2	3
DE	3	6	2	2	3	6
SS	2	4	2	—	4	2
CV	2	1	—	—	—	—
C	3	2	2	—	2	—
1969 DD	9	12	4	3	2	3*
DE	3	6	2	2	3	6
SS	2	4	2	—	4	2
CV	1	1	—	—	—	—
C	3	2	3	—	2	—
1971 DD	11	12	4	8	2	3
DE	3	6	1	2	3	6
SS	2	4	2	—	4	2
CV	1	1	—	—	—	—
C	3	2	3	—	3	—
1973 DD	10	12	4	5	4*	4
DE	4	5	3	—	3	6
SS	4	4	2	2	4	3
CV	1	1	—	—	—	—
C	2	1	3	—	3	—
1975 DD	8	15	6	4	4	5
DE	—	3	5	4	2	6
SS	4	9	3	4	8	3
On Order						
CV						
C						
DD	2	4			4	4 <sup>c</sup>
DE	6	6				
SS		1				2

<sup>a</sup>Sources: Refs. 5, pp. 103-123 and 2, pp. 62-67, 82 (and preceding issues)

<sup>b</sup>CV = Aircraft carrier, C = Light cruiser, DD = Destroyer, DE = Destroyer escort or frigate, SS = Submarine.

<sup>c</sup>In addition, Venezuela has ordered 6 missile-armed fast patrol boats.

\*First appearance of naval surface-to-air and/or surface-to-surface missiles. Hereafter, a portion of these warships are so armed, and new deliveries can be expected to be missile armed.

Table 9

GUIDED MISSILES<sup>a</sup>

	Argentina	Brazil	Chile	Colombia	Peru	Venezuela
1963	← none →					
1964			c <sup>b</sup>			
1965	C					
1966		C				
1967						
1968						
1969	M					C
1970	C					
1971						
1972	Q	Q,X				P
1973	Q	Q,X			A	
1974						A
1975						
On Order	B,M	A,B,C,M	A,M		B	A

<sup>a</sup>Sources: Refs. 5, pp. 103-123, 143-145 and 2, pp. 62-67, 93 (and preceding issues)

<sup>b</sup>Letters indicated type of missile (see accompanying chart) and year of first appearance. Some actual numbers of types delivered and specific systems on which mounted are available in Refs.

Type	Name (producer)	Range (km)	Year developed or first produced
A	MM38 Exocet naval SSM (France)	37	1971
A	Otomat naval SSM (France/Italy)	60-80	1971
B	GAF Ikara anti-sub (Australia)	20	1960's
B	Seadart naval SAM (U.K.)	27-36	1965
B	Gabriel naval SSM (Israel)	15-20	late 1960's
B	Albatross naval SAM (Italy)	13	1971
C	Short Seacat naval SAM (U.K.)	4	1967
C	Short Tigercat army SAM (U.K.)	4	1962
M	SS-11 SSM (antitank) (France)	3	1962
M	AS-11 and 12 ASM (France)	3	1962-66
M	Cobra 2000 antitank (W. Germany)	1.6	1960
M	Bantam antitank (Sweden)	2	1963
P	Sidewinder AAM (US)	3.4	1954
Q	Matra R.530 AAM (France)	18	1963-4
X	MBB Roland army SAM (France/W. Ger.)	6	1968
Z	Hawk army SAM (US)	35	1959

Peru has ordered the Albatross SAM for its "Lupo" class frigates under construction. There are no indicators which might lead one to believe that this trend toward modernization with missiles will abate.

Table 10 shows in brief the latest available unclassified data concerning force levels, expenditures, and equipment. These represent the cumulative effect of the foregoing arms acquisition processes. Note that the combat aircraft category includes all types of aircraft—super and subsonic jets, bombers, counterinsurgency aircraft, and the older, obsolete aircraft still maintained in the inventories. For a more detailed equipment recapitulation, refer to the latest IISS publication, The Military Balance 1975-1976.

In its Arms Trade with the Third World, the SIPRI described the typical arms competition pattern in South America. Brazil and Argentina, the two wealthiest nations, have traditionally competed with each other. Chile has generally followed Argentina's lead. Peru's special concern with the Chilean military posture—dating back to former disputes and clashes—justifies her competitive expenditures. Venezuela has maintained a superiority in air power while not attempting to compete in naval armaments. SIPRI sums up by pointing out that the United States' role of sole supplier in the 1950's and early 1960's enabled her to control to a degree the balance and pace of arms levels in the region, both quantitatively and qualitatively (Ref. 4, pp. 701-702).

By concurrently studying and comparing the data displayed in Tables 3-10, we can draw some conclusions as to the present-day pattern of competition. In 1963, the relative burdens for Argentina and Chile were the highest within the entire period. The Brazilian army and navy were the strongest in terms of tanks and warships, followed by Peru (tanks) and Argentina (warships). The air forces of Argentina, Peru, and Venezuela were of comparable power, followed by Brazil and Chile. Colombia was the weakest militarily. None of the six nations was armed with any type of missile. Chile broke the missile barrier in 1964 when it armed two of its destroyers with the British Seacat, perhaps in response to its traditional rival's greater naval strength. In the same year, Chile upgraded its tank forces, possibly to offset Peru's greater armored strength. The increases in military expenditures and relative burden in Brazil in 1964 may have been last-ditch attempts by President Goulart to stave off (unsuccessfully) a military reaction to his anti-militarist policies of past years. The new junta significantly increased arms imports in 1965, notably in its armored forces, as part of its program to upgrade its long neglected forces. Argentina, possibly reacting to Chile's new weapon, armed her navy with the Seacat in 1965. 1966 was a year in which military expenditures increased in all nations except Peru, while imports were highest in Chile, Colombia, and Peru. Argentina and Brazil both obtained additional Class B tanks, and Brazil armed one of its destroyers with the Seacat missile. Argentina began

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Table 10

THE MILITARY BALANCE 1975-1976<sup>a</sup>

	Argentina	Brazil	Chile	Colombia	Peru	Venezuela
GNP (estimated 1974, billions of dollars)	86.7*	90.3	18.5*	13.6	9.5	19.3
Defense budget/ expenditures (millions of dollars)	1031* <sup>b</sup>	1283 <sup>b</sup>	213* <sup>d</sup>	102 <sup>d</sup>	226 <sup>d</sup>	494 <sup>b</sup>
Population (millions)	25.01	107.71	10.63	24.72	15.85	12.13
Armed Forces (thousands)	133.5	254.5	73.8	64.3	56.0	44.0
Army (thousands)	83.5	170.0	40.0	50.0	39.0	28.0
Tanks (lt. & med.)	240	350	146	n.a.	360	160
Missiles	Yes	Yes	No	No	No	No
Navy (thousands)	33.0	49.5	21.8	8.0	8.0	8.0
Warships	16	24	18	13	14	14
Missiles	Yes	Yes <sup>c</sup>	Yes <sup>c</sup>	No	Yes	Yes
Air Force (thousands)	17.0	35.0	12.0	6.3	9.0	8.0
Combat acft (all types)	132	160	32	16	94	85
Missiles	Yes <sup>c</sup>	Yes <sup>c</sup>	On order <sup>c</sup>	No	No	Yes <sup>c</sup>

<sup>a</sup>Source: Ref. 2, pp. 62-67, 93.<sup>b</sup>Budget for 1975<sup>c</sup>Source: Ref. 5, pp. 103-123.<sup>d</sup>1974 expenditures.

\*Unreliable due to inflation.

replacing its old F86 fighters with the sophisticated A4 Skyhawk. In 1967, Peru's expenditures and relative burden rose, possibly in reaction to Chile's recent improvements, and Brazil's arms imports increased to a large degree. Argentina imported additional Skyhawks. Imports in the other four nations dropped off in this year. 1968 was an active year in South America, politically as well as militarily—Peru and Brazil both saw military coups—leftist in the former and conservative in the latter. Imports tripled in Argentina and Peru—with the Argentinians possibly upgrading their tank forces and with Peru becoming the first nation to obtain the B-class French Mirage V jet fighter. Argentina and Brazil continued to arm as the latter's expenditures and burden went up, and her destroyer inventory increased by two. Argentina's imports doubled with the addition of air-to-surface missiles and possibly more tanks. Venezuela began arming its navy with the Seacat.

In 1970, Argentina significantly upgraded its army with the addition of the British Tigercat surface-to-air missile (a version of the naval Seacat surface-to-surface missile), and the German Cobra 5000 antitank missile. Despite these developments, imports and expenditures declined, possibly as a result of that year's coup. Although Brazil's imports dropped off in this year, her expenditures rose, and she experienced her highest relative burden of the entire period. It was up in all other nations as well, with the exception of Venezuela. Perhaps as a result of Allende's ascent to power and in an attempt to improve Chile's image, imports and expenditures rose during 1970-71. Peru's increasing expenditures and imports which began in 1969 and continued through 1971 may have occurred for similar reasons. Expenditures were also up in Venezuela and Colombia (which added five destroyers to her fleet). Argentina suffered another coup. The three largest naval powers ordered new construction in frigates and submarines.

In 1972, relative burden dropped in all nations, as did expenditures except in Brazil where they increased slightly. Arms imports, however, were large and significant. Argentina obtained more French AMX-13 light tanks and armed her new Mirage III's with the Matra R.530 air-to-air missiles over the next year. Other nations also made qualitative leaps in their air power during 1972-73. Brazil obtained the Mirage III, Colombia the Mirage V, and Venezuela was the first to arm with the Class A Canadian version of the F5 Freedom Fighter, complete with air-to-air missiles. Venezuela, during 1972-73, also was the first nation to obtain a significant number of Class A medium tanks—142 French AMX-30's. Brazil obtained air-to-air missiles as well as a tactical surface-to-air capability for its army. Brazil may also have obtained a very few French AMX-30 tanks, and she began co-production of the Italian M.B. 326GB, an armed jet trainer known in Brazil as the AT-26 Xavante. In 1973, Peru created a great deal of alarm, not only by fitting two of her destroyers with the modern, longer range, French Exocet naval surface-to-surface missile, but by obtaining the first

22 of 200 Soviet T55 tanks she was to have by late 1974, a significant improvement over the armored forces of her neighbors. 1973 also saw Allende's demise, and, although imports were up in Brazil and Venezuela, expenditures and relative burden fell in all nations.

In 1974, new heads of state assumed office—Pinochet in Chile, Geisel in Brazil; Argentina's Peron died. Brazil's inventory of light tanks increased, possibly in response to Peru's new program which continued (perhaps as a result of the two relatively unfriendly conservative military regimes in power in her strongest neighbors). Venezuela obtained the Otomat, a new, sophisticated, long-range naval surface-to-surface missile system for her new fast patrol boats and corvettes.

Data for 1975 are incomplete. Brazil added three destroyers to her fleet, and both she and Peru doubled the number of their submarines. Chile and Colombia both obtained two new submarines. Late in the year, Peru underwent her first coup since 1968, although the general political atmosphere does not appear to be changing much so far.

If pending armaments orders are any indication, the future is not full of encouragement. Argentina has ordered new destroyers and frigates armed with the British Seadart SAM and the Israeli Gabriel SSM. Brazil seeks the American F5E Tiger II Class A fighter, as does Chile, Peru, Colombia, and Venezuela. In addition, Mirages and Xavantes are also on their way. Brazil has ordered six "Nitheroi" class frigates armed with Seacat, Exocet, and Ikara missile systems. Peru has four missile-armed frigates scheduled for delivery, and Venezuela has pending the acquisition of two new subs, four frigates, and six fast patrol boats, the latter two types being armed with the Otomat system.

Thus the balance has changed since 1963. Peru is strongest in tank forces, followed by Brazil and Venezuela. Brazil has assumed the lead in sophisticated aircraft, followed by Argentina and Venezuela, which has the most modern force. Brazil has the predominant navy, while Chile and Peru have more or less drawn abreast of Argentina. Five of the six have obtained some combination of guided missiles, Colombia being the only exception.

Several patterns seems to emerge from this somewhat detailed chronology. Significantly, the armed forces of the big six in Latin America are no longer satisfied with obsolete, second-rate weapons and systems, and these countries, to varying degrees, are actively engaged in programs of qualitative improvement of their land, sea, and air power. The predominant competition pattern continues to be the interaction between Brazil and Argentina, although the latter's political and economic problems may have caused the somewhat sporadic response to Brazil's steady economic and military growth. Chile is beset by similar problems and her attention appears to be divided between the Argentina situation on one border

and the rapid rise in strength and influence of another traditional rival, Peru, on another border. Peru's actions in the military arena seem designed to complement her political bid for the leadership of the Andean group (along the western coast of South America) in order to offset Brazil's expanding potential for continental hegemony. Venezuela appears to be arming somewhat independently, though certainly not in isolation from the others, perhaps because of her role in OPEC and her economic growth as well as her more Caribbean outlook.

## FACTORS INFLUENCING PATTERNS OF COMPETITION

The patterns of arms competition which seem to emerge from the data examined in the preceding section may be visualized as:



In terms of intensity, primary competition takes place between Argentina and Brazil, Chile and Peru. Competition of secondary concern occurs between Argentina and Chile, Peru and Brazil, while Peru and Colombia, Venezuela and Colombia and Brazil compete in a tertiary manner.

The preconditions necessary for the occurrence of these competitions are present. Each of the six states, apparently experiencing certain perceived resource and/or position scarcities in terms of numbers and sophistication of weapons and systems or in terms of influence, prestige or hegemony, is attempting to correct these perceived deficiencies—in an indirect way by interaction with weapons suppliers or within the "court of the world (regional, domestic) opinion," rather than by directly contesting with each other for power and influence. Were there not a perceived or imperceived incompatibility of goals, aims or objectives, then the patterns of competition in terms of action-reaction that have emerged would not be visible. The chief difficulty lies in discovering these goals, aims and objectives and attempting to determine the reasons for their existence and incompatibility. The scope of this study is too limited to bring to bear the wide variety of theories of international relations or nation decision-making processes that might be operative. We are limited to offering a few of these explanations in terms of political, military and economic influences as a means of suggesting areas to which further study and investigation should be devoted.

Political, military and economic factors that influence quantitative and qualitative aspects of arms competition in Latin America are, of course, closely interrelated. The maintenance of armies and the levels of armaments are linked to some perceived threat to national security or to the furtherance of some national interest, goal, or objective that might require their use. The main difficulties lie in determining the threats and the national interests; problems which even a nation as large and powerful as the United States cannot apparently resolve. Perceived threats in Latin America seem to fall into three major categories: threats to the hemisphere from outside,

historically from Western Europe, then the Soviet Union; interstate threats within Latin America; and, finally, internal threats to the viability of governments, regimes, economies or national identity. National interests may or may not be related to these threats. An interest by Brazil in continental hegemony would certainly be viewed as a threat by the Spanish-speaking countries. Actions to increase national prestige might be designed to influence neighbors' attitudes or to alleviate domestic unrest by raising the national consciousness and thus reduce an internal threat to the ruling government or regime. There are many other possibilities, but the military seems to play an important role in all of them. Economic factors are complicated indeed, covering a wide range of matters including the attraction of foreign investment, grant or credit aid for obtaining weapons, the ability to purchase more modern improvements, and the alternative uses of resources devoted to armaments.

Political relations among the South American powers have been relatively calm in recent years despite the rise and fall of many military and nonmilitary regimes and the past rivalries and clashes that have affected national ethnocentric outlooks toward neighbors.

Since the Second World War and through the early sixties primary motivations for armaments have been the Cold War and Latin America's role in hemispheric defense at the urging of the United States. During this period, the US was the primary supplier of military assistance and equipment, mostly consisting of old World War II tanks and arms, ships and the more obsolete subsonic jet aircraft. Some still see the Soviet threat to Latin America in terms of two major objectives: to erode the land base of US seapower and to build up a land base for worldwide Soviet seapower (Ref. 6, p.1025). Not only armaments levels but the presence of military dominated regimes in Uruguay, Bolivia, Ecuador, Brazil and Chile have been attributed to this communist offensive (Ref. 6, p.1052). Others feel that the Latin American armies could at best play only a limited role in the strategic defense of their countries (Ref. 7, p.179). The existence of the buffer-like states of Ecuador and Uruguay may further reduce the potential for international violence.

Latent or incipient conflict situations in Latin America are numerous. David Wood describes the principal border disputes and inter-nation grievances that were operative up to 1967 (Ref. 8, pp.6-7). If those conflicts in which the US played a significant role (Cuba and The Dominican Republic) are excluded, there has been only one "war" in Latin America since the Chaco War between Paraguay and Bolivia in the 1930's. The brief conflict between El Salvador and Honduras in 1969—the so-called "football war"—due primarily to population pressure and economic depression, was successfully ended through the efforts of the Organization of American States after

three weeks (Ref. 9, p.55). In 1966, John L. Sutton and Geoffrey Kemp described arms competition in Latin America as an "arms walk" primarily due to the absence of severe border disputes, its distance from the areas of conflict between the great powers, and the emphasis on naval rather than air power. Also cited were the lack of modern tanks and the low number of missiles in the region (Ref. 10, pp.11-30). At about the same time, E. B. Glick argued that while many believe that the US was spurring a costly arms race in the name of anticommunism, the pattern was not new to Latin America, being tied more to nationalism, prestige, sovereignty, power politics, personal aggrandizement and despotism (Ref. 11, p.744).

A December 2d, 1974 article in Aviation Week and Space Technology heralded, "Peru Military Buildup Worries Neighbors," especially Chile, who feared Peru's potential use of the 200 recently acquired Soviet tanks mentioned earlier. The major thrust of the article, in terms of political relations with Peru's two principal neighbors is that:

The feared Peruvian threat to Chile, imagined or otherwise, also is making Brazil, Peru's eastern neighbor, increasingly nervous. The conservative Brazilian military regime supports the current Chilean administration, but it has no desire to be drawn into a war in its support. Brazil is embarrassed by, and attempting to live down, resentment by other Latin American countries of its economic/geographic predominance on the continent and suspicions that it would like to establish political hegemony over its neighbors. A thrust into Peru in support of an invaded Chile would do little to diminish this image (Ref. 12, p.21).

A survey of news stories in The New York Times during 1975, however, reflects little of this concern in the public press (Ref. 13). Brazil's great size and wealth, coupled with greater political stability (albeit imposed by the armed forces) make it possible that she will, in the long run, establish some sort of economic, if not political, hegemony over her neighbors in South America. Argentina is the only other nation in South America that has the potential to challenge Brazil's emerging preeminent position, but currently racked by political and economic turmoil of severe intensity, it appears unlikely that Argentina will be able to take up the challenge.

If the hemispheric threat from the international "communist monolith" has receded, and the relations among the South American nations, despite traditional differences and the thrust of potential developments, are relatively stable, other factors that may well

influence the acquisition and improvement of armaments are the importance of prestige and the political roles the military play in the domestic affairs of each national society. In other words,

In Latin America, the military uses of weapons are few. The extra-continental threat to Latin America is virtually non-existent. Wars between Latin American countries are rare. The possibility of internal revolutions has probably been exaggerated but in any case, where they break out, aircraft carriers and supersonic aircraft are not of much use. In the majority of Latin American countries, the function of maintaining internal security is relegated to very large police forces or special paramilitary units of the armed forces (Ref. 4, pp.52-53).

Thus, "the main requirement for weapons derives from the political role of the armed forces" (Ref. 4, p.52).

As SIPRI and others point out, weapons are the power symbols of the military establishment and the establishment wields considerable weight on the domestic political scene. This political weight ensures that the demand for weapons will be met which in turn ensures that the political role will be maintained.

[Weapons] may not be necessary for storming palaces or for battles with rival services, but they are necessary to demonstrate the power of the armed forces, to maintain the prestige of the military establishment. Two factors contribute to the demand for weapons for this purpose. The first is inter-state rivalry, or to put it another way, the demonstration effect. Acquisition of one type of weapons by one country makes it necessary for another country to acquire a similar type more for prestige than for defence (Ref. 4, p.54).

The other factor is inter-service rivalry. Dependent on which service is in power or is exerting the most influence, the demand for weapons will be reflected in the acquisition or improvement of land, naval or air weapons and systems.

The traditional subordination of military power to civilian authority which exists in the United States and some other western democracies does not exist in Latin America. This fact is basic to the lack of understanding exhibited by many Americans who, perhaps rightly, decry the repression, instability and violence that accompany the many coups and juntas that occur, and lead people such as Senator Church to question American military assistance to these regimes and ask, "Why shouldn't they be subverted?" (Ref. 4, p.722). The armed

forces in South America have always played a political role whether by direct intervention or by sufferance toward the ruling civilian governments. Professor Lieuwen points out that political interventions by the military during the years 1961-1967 were not autonomous but were encouraged by opposition civilian elements (Ref. 3, p.6). Elizabeth H. Hyman adds that the only coups that are successful are those that are sensitive to civilian opinion and encourage either broad civilian involvement or tacit support (Ref. 14, p.70). The IISS concludes that Allende's failure was due to a political strategy that considered only the capitalist bourgeoisie and the proletariat and ignored the middle strata of professional groups, public servants, artisans and truck drivers who, in countries like Chile, may well be the most numerous of all (Ref. 9, p.82). The Chilean armed forces, which had previously kept out of politics (Ref. 15, p.673), stepped in (purportedly) to save the country from economic and political chaos. Whether the current regime will be an improvement remains to be seen. The Peruvian armed forces are specifically charged by the constitution to "guarantee the rights of the republic, the fulfillment of the constitution and laws, and the conservation of public order" (Ref. 4, p.54). Similar circumstances have been seen in Brazil and are currently obtaining in the continuing turmoil of the Peron government in Argentina. The problems that governments and the armed forces face include poverty and unemployment, economic underdevelopment and stagnation, and social injustice and inequality, hardly soluble in the face of internal insecurity and disorder. A policy of prestige in the armed forces, exhibited by the acquisition of new weapons, not only increases the influence that the nation can exert internationally, but may very well serve to heighten at the same time, the national consciousness of those sectors experiencing severe relative deprivation and thus reduce internal pressures by diverting attention to the outside world.

The economics of arms competition in developing nations is a subject of much controversy both in the international arena and within the US foreign policy establishment. Many view heavy expenditures for sophisticated armaments as a gross misallocation of scarce resources which more properly should be devoted to the pressing human problems that are a major cause of instability. The proposition that arms competitions between countries with advanced economies are more likely to be qualitative in nature and those between countries with developing economies are more quantitative in nature is rather simplistic. The industrial nations of course have greater technology and resources to devote to qualitative improvement of weapons and systems while the impoverished nations must generally rely on grant aid from a wealthier nation in order to obtain arms. We have seen that the US played this role in Latin America after World War II, being almost the sole supplier of old obsolete equipment, and thus exercising to some degree control over the intensity of competition. This is not the situation today in Latin America. These nations are still in the development stage—none has reached "take-off." Inappropriate development criteria, high rates

of inflation and domestic political instability further retard rapid economic growth. Contributing to these problems is the qualitative nature of arms competition among the six large powers in South America. Modern tanks, all manner of land, sea and air guided missiles, refitting of naval vessels, and modern sophisticated jet aircraft unquestionably impose a far greater burden than old Sherman tanks and Korean War vintage fighters. As these stocks depreciate and become obsolete, the increasingly professional and sophisticated armed forces understandably desire the most modern weapons that their money can buy, even though, considering conflict potential is low, the resources required could more profitably be put to use elsewhere. It seems more appropriate to state, that as economies develop, an increasing portion of arms expenditures will be devoted to the qualitative rather than quantitative improvement of forces. Brazil, and to a lesser degree, Argentina have developed to the point where home production of small arms, bombs, ammunition, unguided missiles, explosives, light trainer and transport aircraft is possible. A shift is also occurring from outright purchase or credit arrangements for more sophisticated planes and ships to co-production and licensing agreements between suppliers and recipients. In this respect, the development of heavy industry is assisted. There is also a developing trend toward arms exports from some of these nations although they accounted for only a little more than one percent of the dollar equivalent of the arms imported during the 1963-1973 period. Most of these exports consist of a portion of the items produced which were mentioned above plus the sale of older, obsolete equipment to smaller, less advanced nations. The interaction of supply and demand, according to SIPRI, involves three complex relationships that must be taken into account when discussing the economics of the arms competitions: the relationships between the arms supplier and the arms recipient, the relationship between the level of the arms supply and the effects on the conduct of or potential for wars, and the relationship between the arms trade itself and the internal social conflicts and economic development (Ref. 4, p. 59).

Recognizing the need to promote internal stability in order to advance economic and political development, the US shifted its military assistance emphasis from hemispheric defense to counterinsurgency and internal security operations in 1960. The ideas were to promote greater coordination, to counter destabilizing revolutionary movements, to prevent the acquisition of sophisticated weapons and to promote training and functional civic action programs by the military (Ref. 4, pp. 702-722). The chief results, however, were criticisms like Senator Church's that the US was promoting militarism and helping to maintain in power repressive right-wing regimes and Latin America's turning to Europe for the acquisition of sophisticated weapons that the US refused to supply. British, French and Italian firms among others began competing to supply modern ships, submarines, jet aircraft and missiles to nations who viewed America's position as patronizing and an affront to their

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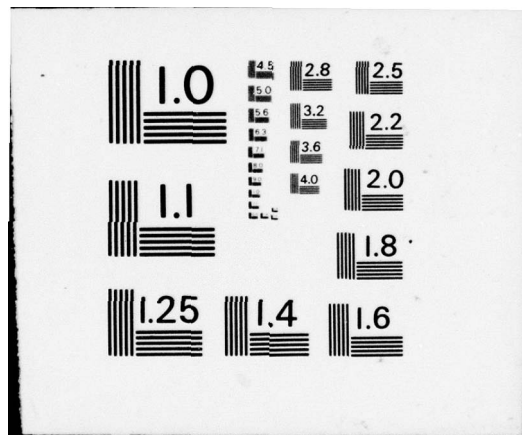
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sovereignty (Ref. 16, pp. 28-31). Because of these effects, the US has again shown a willingness to enter the market in order to regain economic advantage as well as to attempt to assert some degree of control over arms imports in South America. There is the possibility that US administrations may have tacitly encouraged European governments to supply Latin America's perceived need for improved weapons in the face of Congressional resistance. In any event France eventually became the leading supplier of sophisticated arms to Latin America to the chagrin of American arms producers. In the 1967 hearings before the Subcommittee on Western Hemisphere Affairs, those opposed to increased American sales argued that the effects on American producers were no justification for increased involvement and recommended total disengagement. On the other hand, Assistant Secretary of State Charles A. Meyer argued that inter-American relations will not be improved by any attitude on our part that says, in effect: "You don't need anything more advanced in military equipment than the 20-year-old items you have and, furthermore, if you elect to buy anything more advanced than what you already have from anybody, we will consider it an irresponsible act and penalize you accordingly" (Ref. 17, p. 60).

He goes on to say:

Unfortunately the long-term consequence of our paternalistic, even patronizing restrictions will be the acquisition of more expensive items, higher maintenance costs, and greater diversion of financial resources from civilian purposes. The end result could be a real arms race which fortunately, thus far, has been avoided in Latin America (Ref. 17, p. 61).

Despite the great intrusion of European suppliers into America's traditional market, SIPRI feels that the US will probably revert to its dominant position in arms sales to Latin America (Ref. 18, p. 195). Brazil's recent experiences are an illustration of this trend. High operating costs of French Mirages, frustration and price bumping suspicions of the French/FRG Roland program and rising prices on frigates ordered from the UK had led Brazil to look again to the US for weapons. She has already ordered a number of F5Es and is considering refitting her Mirages with American jet engines (Ref. 19, pp. 21-22). The success of this policy does not appear imminent, however, when one views the recent acquisition of Soviet equipment by Peru and even Uruguay. Detailed treatments of the effects of American attempts to limit the qualitative improvement of Latin American armed forces are available in the Spring 1974 issue of Strategic Review, Strategic Survey 1968, the hearings before the Senate Foreign Relations Committee on 24 June and 8 July 1967, and the previously cited SIPRI publications.

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In summary, while the hemispheric or overt external threat to the Latin American nations has receded in recent years, the internal threat to domestic security has not. This, coupled with the primacy of the political role of the armed forces on the domestic scene and the great importance that prestige holds not only on the inter-nation front but internally as well, influences directly the demand for armaments in Latin America. Equally important are the effects of the economics of the situation, in terms of misallocation of resources and the increased burden it places on alternative development, and the good and bad effects of competition among suppliers, in terms of not only real value but also in terms of notions of sovereignty and, again, prestige.

## POTENTIAL UTILITY OF QUALITATIVE CONSTRAINTS

This review suggests that the six major powers of South America compete more qualitatively than quantitatively at present and in a relatively stable manner. Currently pending arms deals illustrate the increasingly qualitative nature of the prospects for future competition. Influences on competition do not appear to originate from primarily external or hemispheric threats but are more directly related to matters of prestige and the political roles of the military establishments. Money, predictably, determines the quantity and quality of arms, and illustrates the burden that armaments place on alternative economic development. For economic or political reasons, suppliers compete for resources developing nations can ill afford to divert from the social problems they face.

All of this leads to an examination of the potential utility of qualitative constraints on the conventional arms competitions in Latin America. Immediate questions are raised. What is to be restrained? Who will accomplish the restraining? Are the restraints desirable? Feasible? And above all, from whose point of view?

The basic stages in the weapons progression—research and development, test and evaluation, production or acquisition, deployment and transfers, do not appear across the board in the arms competitions in Latin America. Although, as pointed out earlier, the trend is shifting toward co-production of some armaments, and Brazil and Argentina do produce much of their own small arms and ammunition, research and development leading eventually to production is undoubtedly small. Where it does occur, it would be jealously guarded as an essential part of overall industrial and technological national development. Thus, controlling the first two stages of the process (research and development, test and evaluation) is probably neither desirable nor feasible from the points of view of the developing nations, no matter how far in the future the actuality of viable research, development, test, evaluation, and production of sophisticated anything might be. Transfers of sophisticated weapons between nations within Latin America are nonexistent, and the concept of deployment of these weapons and their accompanying forces is not of major concern (except, perhaps, in the case of Chile, who, according to some, eyes with a certain amount of alarm the relative nearness of Peru's new tank force to her border). The acquisition process, or, where the Latin American powers are on the receiving end of transfers from the developed world, appears to be the most likely area of success for restraining the import of sophisticated armaments into the region.

The next question is that of who will be constrained and how; in other words, what form will any qualitative constraint agreement take?

Aside from Cuba, Latin America has not been an active major target of Soviet penetration in a superpower context, although the potential certainly exists. More intense crises confront the giants in other portions of the globe and discourage serious considerations of South American problems (relatively speaking, that is). The record of US attempts, as sole supplier, to constrain armaments and the resulting Western European intrusion into the market illustrates the relative futility of an agreement among arms-producing and supplying nations. Sutton and Kemp point out that:

It can be argued that until the demands for arms falls, the supply of arms cannot be controlled, since the number of potential suppliers and the stockpile of weapons throughout the world are both so great (Ref. 10, p. 31).

This is further illustrated by the previously mentioned Soviet entrance on the market in South America. In view of the political and prestige factors we have discussed, it is unlikely that the other Latin American countries will follow Costa Rica's unprecedented lead in 1948, and abolish their armed forces. Global agreements for general and complete disarmament are highly unlikely, and restraints on the part of consumers (e.g., Mexico or Costa Rica) or on the part of suppliers appear to be scarcely more likely.

A combination agreement among consumers at the regional or perhaps sub-regional level would appear, on the surface, to have the most likely chances for success. Questions of desirability and feasibility of such an arrangement are interrelated and difficult to isolate. Would such an agreement be desirable? From whose point of view? Certainly from the US point of view in terms of further stabilizing our "back door" in order to allow increased concentration on more unsettled regions. Also, from both the US and South American points of view in terms of devoting resources and funds saved to the pressing problems of poverty, hunger, disease, inflation, unemployment, agricultural, and industrial development. But other questions of desirability and feasibility arise. E. B. Glick discussed these factors in some detail in 1965 in "The Feasibility of Arms Control and Disarmament in Latin America" (Ref. 11). Among others, he raised questions of increased demands on the US to assume a greater burden of hemispheric defense as Latin American armaments and forces stabilize and fall behind; the conversion of military forces to increased nonmilitary within each nation; military acquiescence in a shrinking share of funds and political power; "denationalism" being required to alleviate the prestige factor among these nations; and, finally, the cooperation of outsiders in abiding by a regional agreement of some sort. He concluded then that "significant arms control measures...are not now feasible and may very well be undesirable" (Ref. 11, pp. 748-749).

Latin America certainly recognizes the desirability of some form of control—witness the previous calls for limits on arms—by Costa Rica in 1958, Chile in 1959, the Punta del Este Summit in 1967, and by Colombia in 1971 (Ref 20, pp. 88-9). Lack of feasibility was illustrated by the lack of success of these initiatives. Arguments for and against regional agreements generally run along lines previously suggested. Pro: forces are required only for internal security as inter-nation tensions are low; armaments divert resources from much more urgent domestic needs. Con: there is no urgent, high-priority need because tensions are low and present military budgets are neither crushing nor spiralling dangerously; besides, such agreements would infringe on national sovereignty.

The considerations presented above do not give one much hope for the success of an agreement. However, 1974 witnessed, as the IISS in Strategic Survey 1974 reports, "The major new aspect of international arms control was the declaration by the Andean group of Latin American states calling for a limitation on the impact of 'offensive weapons' into the region" (Ref. 9, p. 91).

On 9 December 1974 eight Latin American states issued the Declaration of Ayacucho by which they pledged themselves not to purchase 'offensive weapons of a sophisticated nature'. The signatory states comprised the 'Andean group' of Peru, Chile, Bolivia, Argentina, Ecuador, Colombia, Venezuela and Panama. The Declaration was the result of an initiative taken early in 1974 by the President of Peru, Juan Velasco Alvarado. Brazil was a notable non-signatory and has expressed some scepticism over the worth of the Declaration; both 'offensive' and 'sophisticated' are terms which lend themselves to varied usage. The Declaration is potentially of significance for four reasons. First, it was signed in a political context of very considerable, and mounting, political tension between some of the signatories (Peru and Chile above all). Secondly, the timing of the Declaration is such that it could slow down the arms race in Latin America. Thirdly, the Declaration was strictly a Latin American initiative. Finally, if reasonably successful, the Declaration and the treaty to which it might lead could serve as a model for states in other regions. A Latin American summit conference is to be held in Caracas in the summer of 1975 to transform the arms-control section, at least, of the Declaration of Ayacucho into a detailed treaty.

Peru's initiative was prompted by a desire to save money on military programmes in order to promote social reform and civil investment, but she also wanted to offset the negative perception by her neighbours concerning her 1973 arms deal for the acquisition of 200 T-55 tanks from the Soviet Union and 20 Mirage VP fighters from France. If the Andean states endorse an agreement in Caracas in 1975 to limit arms imports, the success of such an undertaking will depend on whether Brazil decides to become a party to the arrangement. The variety and depth of political antagonisms in Latin America, together with the possible hegemonic aspirations of Brazil, could otherwise render the Declaration of Ayacucho a mere monument to good intentions (Ref. 9, 1974, p. 93).

The Caracas meeting has not yet taken place, although The New York Times reported on 30 June 1975, that Bolivia, Chile, Colombia, Ecuador, Peru, and Venezuela had reportedly decided—rather pragmatically—in February to include defensive weapons in the agreement since the distinctions between offensive and defensive sophisticated weapons are highly controversial (Ref. 13). It remains to be seen whether or not the Declaration of Ayacucho will be successful, especially without the participation of the major power on the continent—Brazil. In view of Hans Morgenthau's dictum that, "The termination of military competition... depends upon the settlement of the outstanding political issues" (Ref. 10, p. 405), such a regional initiative does offer some hope for the future.

## CONCLUSIONS

This survey of some of the available literature suggests that several reasons for the relative lack of war, tension, and destabilizing arms races in the region may include the tradition and success of mediation and arbitration, the strong diplomatic role of the US in defuzing crises, underdeveloped and underpopulated border regions, incapacities to organize resources and forces, the inequality of claimants in disputes, and perhaps more importantly, a preoccupation with internal problems.

Compared with Angola and Africa or the situation in the Middle East, arms competition in Latin America did not occupy a very significant place in American foreign policy concerns in early 1976, nor in those of the other major powers in the developed world. From the South American point of view, however, arms competition appears to be a very real problem, primarily in terms of the increased costs of sophisticated weapons and their limited utility in the South American context. Policies of prestige, both internal and external, seem to have been the prime motivators of competition between the six major powers, rather than latent or incipient conflict situations that may exist among them. The addition of sophisticated jet aircraft, missile-armed navies, and modern tank forces will accomplish little in relieving the social pressures for reform and economic development. The alternative uses for which funds now devoted to armaments can be devoted are the chief factors that led to the Declaration of Ayacucho. While Latin America spends a far less proportion of its gross national product on military expenditures than do other regions of the world, that fact does not make the burden attractive to the people of the region.

Many have pointed out that Latin America appears to fit a pattern in arms competition that is not driven by a serious threat or conflict but by a desire to restore the balance. The SIPRI, on the other hand, has been watching with considerable interest the "infectiousness of recent orders" of combat jet aircraft and programs of naval re-equipment and argues in its 1975 yearbook that, "In virtually every case, the acquisition of such weapons (e.g., the F5E Tiger II jet fighter) by a Third World country represents a major increase in military capability" (Ref. 18, p. 198). This divergence of views on the functional or dysfunctional aspects of arms competition illustrates the complexity of the problem.

The Declaration of Ayacucho may mark an important development in the hoped-for abatement of arms competition in Latin America. Brazil will probably make or break the agreement—it is too early to tell what effect her cooperation or lack thereof will have on the budding cohesiveness of the Andean group. Political instability in Argentina

and Chile could also have an adverse effect on successful regional arms limitation agreements. Bailey summarizes the domestic variable affecting the international behavior of Latin American countries as: "Utopianism and violence have been the hallmarks of the social process in Latin America...personalismo, caudillism, messianism, charisma, fanaticism, rigidity, violence, and institution-replacement have been the common fact" (Ref. 21, p. 19).

Latin American society is a fragmented society—fragmented geographically, regionally, racially, socially, economically, politically, and ideologically. Latin America is underdeveloped economically, due largely to this fragmentation, and it is weak politically and militarily due partially to its economic deficiencies. It is strategically important, a repository of large quantities of raw materials. It is Western in its ethical, moral, and social structure (Ref. 21, p. 27).

The relative number of weapons and systems or the relative balance of power among the nations of the region will probably remain the same, but as older systems become obsolete, or as military establishments demand more sophisticated weapons to symbolize their political roles and prestige, we can expect the qualitative aspects of arms competition in Latin America to increase, especially as economic development occurs and the gross national products increase.

While heavily dependent on outside sources for qualitative improvements in their armaments, Latin American countries are especially sensitive to anything that appears to be intrusion from the outside, and particularly from their powerful neighbor to the north. United States policy, therefore, confronts serious dilemmas, whether in supporting recognized defense requirements or in encouraging policies of restraint in arms competition. Probably the best posture is to support arms constraint initiatives from within the area rather than to appear to seek to impose them from outside.

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Appendix D

ARMS COMPETITION IN THE INDIAN OCEAN

George R. Bieber

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## ARMS COMPETITION IN THE INDIAN OCEAN

## DELINEATION OF THE INDIAN OCEAN REGION

The Indian Ocean covers some 28 million square miles of area, and its littoral includes portions of Africa, the Middle East, South Asia, Southeast Asia, and Oceania. Beyond stating this, virtually any definition of the extent of the region is subject to debate. The UN Ad Hoc Committee organized to consider Sri Lanka's "zone of peace" proposal attempted to delineate the region. Criteria were established to include all nations bordering the Indian Ocean and its natural extensions as well as hinterland states. Failure to apply this criterion uniformly and consistently resulted in a compilation that was neither complete nor congruous (Table 1). Notably, the exclusion of South Africa (which has an Indian Ocean shoreline of about 1200 miles) on the grounds that only countries with interests and concerns related primarily to the Indian Ocean should be treated as part of the region, raises questions about the validity, if not the usefulness of the list (Ref. 1).

For this study the Indian Ocean is delineated as follows: (1) western littoral: Ethiopia, Somalia, Kenya, Tanzania, Mozambique, South Africa, Malagasy Republic, and Mauritius; (2) northern littoral: Pakistan, India, Burma, Sri Lanka, and the Maldives Republic; and (3) eastern littoral: Australia, Thailand, Malaysia, Singapore, and Indonesia. Hinterland countries are not included. Persian Gulf and Middle East countries bordering the Indian Ocean or its extensions are discussed elsewhere in this study. Australia is considered only insofar as it has defense treaties with the US and UK and has a limited naval capability (Fig. 1).

## GEOGRAPHICAL CONSIDERATIONS

Conventional arms control proposals for the Indian Ocean focus on three broad aspects: first, the relation between the United States and the Soviet Union and their naval forces in the region; second, the relation among the Indian Ocean littoral states; and, third, the relations between the US and USSR and the states of the region. Current US attention is directed more towards the US/Soviet aspect. Congress, in particular, since 1971, has indicated its desire for a negotiated agreement between the US and Soviet Union, limiting naval deployments in the Indian Ocean. Considerations of quantitative vs qualitative improvements in the armaments of Indian Ocean littoral states in this appendix are generally treated as peripheral to US/Soviet power relationships.

Examination of these broad aspects raises similar questions as to:  
(1) the existence of arms competition; (2) discernible trends of arms

Table 1

DELINEATION OF THE INDIAN OCEAN REGION<sup>a</sup>


---

Afghanistan	Mauritius*
Australia	Nepal
Bahrain	Oman
Bhutan	Pakistan*
Botswana	Peoples Democratic
Burma*	Republic of Yemen
Egypt	(South Yemen)
Ethiopia*	Qatar
India*	Saudi Arabia
Indonesia*	Singapore*
Iran	Somalia*
Iraq	Sri Lanka*
Kenya*	Sudan
Kuwait	Swaziland
Lesotho	Thailand*
Madagascar (Malagasy	Tanzania*
Republic)*	Uganda
Malawi	Yemen Arab Republic
Malaysia*	(North Yemen)
Maldives*	Zambia

---

<sup>a</sup>Source: Ref. 1, p. 62.

\*These countries plus South Africa and Mozambique comprise the scope of the Indian Ocean littoral considered in this appendix.



Fig. 1—Indian Ocean Region

acquisition; (3) the nature of these trends, i.e., quantitative vs qualitative improvements; (4) principal influences/interests relating to arms competition/acquisition; (5) the feasibility and practicality of arms control in the Indian Ocean at this time; and (6) the potential utility of quantitative/qualitative constraints on conventional armaments. Answers to these and related questions will provide insights for assessing the potential success of any negotiated constraints on conventional armaments in the Indian Ocean.

Geographical considerations will undoubtedly have an impact on the outcome of arms control negotiations relevant to the Indian Ocean. First, history demonstrates that the physical proximity of the Soviet Union to the states of the region does not assure the Soviets a capability to project political-military pressure into the region in the absence of a significant naval presence. Conversely, US physical distance from the area does not diminish its capability to exert pressure, given a US naval presence.\*

Second, the size of the ocean, as well as the number and diversity of its littoral states increases the difficulty of applying common measures to the entire area. The ocean itself is probably the major feature shared by all of the littoral states, but due to their colonial past, the lack of significant indigenous navies, and the absence of an oceanic outlook, the ocean has not been a unifying force. It has been, however, the major avenue of penetration by external powers. Thus, the Indian Ocean can be viewed as a single entity only in the context of seapower — in this instance, US/Soviet naval presence. To consider the problem of arms control among the states bordering the ocean outside the context of naval power, the littoral must be separated into the major subdivisions suggested earlier.

#### HISTORICAL CONSIDERATIONS

Historical considerations are also likely to have an impact on the prospective success of arms control in the Indian Ocean. The most important of these are the nature of the region's colonial experience and British success in denying Imperial Russia, and later the Soviet Union, access to warm-water ports in the Persian Gulf.

\*Despite historical evidence, and possibly encouraged by the Navy's policy of officially neither opposing nor supporting negotiations, a number of influential admirals have strongly argued against Indian Ocean naval limitations with the Soviets, primarily on geopolitical grounds. In light of this high level opposition, it seems unlikely that the Navy will give much support to any initiatives in this direction (Ref. 2, p. 140; Ref. 3, p. 351, Ref. 4, p. 22).

In modern times, the Indian Ocean has never been dominated by a littoral state. Historically, control of the sea LOCs has come from outside the region in the form of naval power. Until recent years British seapower virtually transformed the Indian Ocean into a British lake. Political, economic, and military domination of the Indian Ocean region by Great Britain was assured by Nelson's victory at Trafalgar in 1805 and cemented by the opening of the Suez Canal in 1869. The key-stone of the British Empire was India. Possession of Australia, Singapore, South Africa, and the Suez Canal assured British control of sea LOCs into the ocean. Most Indian Ocean islands other than Madagascar, and the entire littoral from present-day Pakistan to Malaysia (with the exception of the Thai coast) were in British hands. Along the East African littoral, only Mozambique and parts of present-day Somalia were not in the Empire (Tanganyika, originally a German colony, became a British mandate after WWI). Control of Egypt, and mandates in Palestine, Transjordan, Iraq, and the Trucial States assured British influence in the Middle East. Britain was nevertheless apprehensive of Russian encroachment in the region. In 1885 Russian "railroad imperialism" resulted in a line southward to the Afghanistan border. To the British, Russian expansionism threatened their interests along the entire Afghan-Persian border. During the reign of Tsar Alexander II (1855-1881) plans for the invasion of India were drawn up and as late as 1902 advisors of Tsar Nicholas II (1894-1917) supported the idea. (Ref. 5, p. 136).

The Indian Ocean political alignment remained relatively static until after WWII. During the war itself, Japanese and German warships penetrated the periphery of the area, but the Axis powers lacked capability to sustain themselves and no major naval engagements were fought in the Indian Ocean itself. The political, social, and economic upheavals that followed WWII, however, led to the disintegration of the British Empire. Beginning with India in 1947, British colonies around the littoral gradually achieved independence until by 1967 only a few small island groups remained under direct British rule.

Despite the end of British colonial domination in the aftermath of WWII, there was no serious attempt by either the Soviet Union or the US to assume Britain's function in the Indian Ocean. The Soviets lacked a naval capability, and the US appeared content to let Britain continue as protector of Western interests in the area, particularly the sea lanes between Europe and Asia. Nor was there a challenge from the newly independent states. Their political priorities were economic rather than military, and the British naval presence was not perceived as a threat. The lack of a visible threat to their sea commerce and the high cost of naval hardware provided little incentive for the littoral states to quantitatively or qualitatively improve the relatively small navies they acquired with independence.

The events that have altered this relative stability in recent years have been: (1) the British reassessment of its military posture and the decision that it could no longer afford the burden of maintaining any significant military force in the Indian Ocean (the "East of Suez" policy announced in 1968); (2) the Soviet development of a "blue-water" navy and its obvious decision to deploy naval forces to the Indian Ocean as the British began to withdraw; and (3) the 1973 Middle East War and subsequent Arab oil embargo that demonstrated the dependence of Western Europe and Japan on Persian Gulf oil; and (4) the potential vulnerability of sea LOCs between Europe and Japan to intimidation or interdiction by expanded Soviet naval forces in the Indian Ocean.

For over 200 years Britain asserted its control over the Indian Ocean through its seapower. During this period every Russian and, later, Soviet attempt to expand southward in pursuit of outlets and warm-water ports on the Persian Gulf was successfully blocked by the strong naval presence maintained by the British along the northern rim of the Indian Ocean basin. The lesson is clear: a strong naval presence is indispensable to any outside power that seeks to influence political, military, and/or economic events in the region. Having finally gained a foothold in the area (Table 2) only within the last decade, the Soviets are not likely to respond eagerly to proposals that they now limit their naval activity.

#### QUANTITATIVE TRENDS OF US/SOVIET NAVAL ACTIVITY

Trends of Soviet and US naval activity in the Indian Ocean in terms of ship days and port calls are indicated in Tables 3 and 4. Despite variations in data (Tables 3A and 4A), these indicators are useful in identifying the overall direction of naval activity in the Indian Ocean. Beyond this however, conventional measures of naval power are of dubious utility for purposes of assessing the feasibility of arms control measures.

Problems associated with the use of current "primary performance indicators" — ship days, port calls, tonnage, force characteristics (size, composition, and condition), staying power (underway replenishment, bases and support facilities), and reinforcement capabilities (total US and Soviet naval reserves, commitments, readiness, access to the area, local support facilities, and allied assistance) — have been reviewed by the Congressional Research Service (Ref. 8). Their report concludes that force comparisons must:

Relate specific measurement tools to specific missions; separate peacetime missions from those related to war; shift emphasis on measurement criteria as the situation changes; break bulk statistics into component parts whenever possible;

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weigh sustained performance, plus capacities to surge; and differentiate current capabilities from future prospects (Ref. 8, p. 14).

Furthermore, numerical methods of comparing forces must be qualified by some method of accounting for such intangibles as strategy, tactics, leadership, training, military morale, and national will.

That the Soviets are also concerned with problems of quantitative and qualitative force comparisons is revealed by Admiral Gorshkov's statement on means of measuring naval power:

...the relative strength of naval forces cannot be measured in number of combatants or their total displacements, just as one cannot measure their combat might by the weight of the gun projectile salvoes or by the quantity of torpedoes or missiles being launched.

Today, the criterion of comparability of naval capabilities is the relative strength of their combat might calculated by the method of mathematical analysis, by solving a system of multicriterial problems for various variants of the situation and different combinations of heterogeneous forces and means. This kind of objective analysis permits the determination of the necessary and sufficient composition of forces and the more rational combination of them which we call balanced forces (Ref. 11, Nov. 74, p. 63).

In another article Gorshkov stated that:

The sharp increase in naval offensive and defensive capabilities is being achieved not only and not so much by an increase in the number of ships and other weapon platforms as by expanding the range of missions which each platform is able to prosecute through its more advanced weaponry. In other words clearly it is not the quantity but the quality of the weapons platforms, i.e., the total power of the potential combat capabilities concentrated on them, which is becoming the ultimate criterion on the scope of operations. (Ref. 12, p. 56). (Emphasis added).

Ultimately not only the overall perception of relative naval strength, but the analysis relied upon to support that perception, is a function of internal political factors. Political goals and ideology determine threat,

Table 2

SOVIET SUPPORT FACILITIES IN THE INDIAN OCEAN AREA<sup>a,b</sup>

Country/facility	Terms of use
Yemen:	
Port facilities	Soviet Navy has access to Aden for bunkering, minor ship repair, provisioning, and shore leave.
Airfields	Soviet military transport aircraft regularly use Khormaksar airfield near Aden. Soviet personnel assemble aircraft delivered by sea from the USSR, and Soviet pilot-test newly assembled aircraft and train Yemeni pilots.
Iraq:	
Port facilities	Soviets have access to port facilities at Umm Qasr. Facilities are limited, but the Soviets are helping to expand and develop them.
Airfields	Soviet military transport aircraft regularly use Iraqi airfields for delivery of military equipment, support of Soviet advisory effort, and transportation of personnel to and from the USSR.
Mauritius:	
Port facilities, Port Louis.	The Soviets have recently secured merchant bunkering rights in Mauritius. <sup>c</sup>
India:	
Naval bases	Same as for all other countries navies.
Airfields	Flight plans for Soviet military transport aircraft to transit India, including enroute stops, are routinely approved.
Bangladesh:	
Port facilities	The Soviet Navy had 8-12 ships present in Chittagong involved in port clearing operations since May 1972 until recently. The operations were completed in June 1974 but a Soviet Navy

Table 2 (Continued)

Bangladesh: Port facilities (Cont'd)	contingent is expected to remain to conduct hydrological surveys of coastal and inland waters. Only limited repair is available for Soviet ships, but bunkering, provisions, and shore leave are available.
Air facilities	The Soviets have a MIG-21 assembly and check-out team at Chittagong and Soviet military transport aircraft have been reported at the airfield.
Somalia: <sup>d</sup> Port facilities	The Soviets have increased their use of, and are expanding naval facilities at Berbera which currently include a restricted area under Soviet control, a combined barracks and repair ship, and housing for Soviet military dependents. It is believed the Soviets may have over 2,000 personnel in Somalia and up to 250 dependents.
Air facilities	The Soviets are engaged in building a new military airfield near Mogadiscio, which could be used for a variety of missions.
Communication facilities	The Soviets have built a communications station near the Somali port of Berbera to provide support for their fleet.

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<sup>a</sup>(Ref. 2, p. 150).

<sup>b</sup>The Soviets have a number of bouys located in international waters. They employ a system of resupply and maintenance of ships moored to these anchorages. Among other places these are known to be situated off Mauritius, the Seychelles, the Malagasy Republic, Cargados Carajos (east of Madagascar), and the Chagos Archipelago (Ref. 4). Socotra, near the mouth of the Red Sea has no port facilities or fuel storage and its airfield is of WWII vintage and therefore unsuitable for modern aircraft. However, it is used as an anchorage by Soviet forces (Ref. 2., p. 169).

<sup>c</sup>Soviet merchant ships are frequently employed for support of Soviet naval forces. Additional bunkering rights have been obtained at Singapore (Ref. 6, p. 2118).

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<sup>d</sup>In 1975 the Secretary of Defense, James Schlesinger reported the presence of Soviet missile storage and handling facilities in Somalia for shipboard anti-ship missiles, and air-to-surface missiles (Ref. 7, p. 13).

Table 3  
US/USSR SHIP DAYS IN THE INDIAN OCEAN 1968-1975<sup>a</sup>

Type ship	1968		1969		1970		1971		1972		1973		1974		1975	
	US	USSR	US	USSR	US	USSR	US	USSR	US	USSR	US	USSR	US <sup>c</sup>	USSR <sup>c</sup>	US <sup>c</sup>	USSR <sup>d</sup>
Carriers	6	0	0	0	5	0	6	0	23	0	80	0	94	17	125	0
Surface warships	1382	403	1006	644	867	788	669	1028	944	2381	1312	3160	1347	4916	1188	1600
Amphibious	0	0	0	106	0	302	183	291	23	273	18	320	31	277	0	555
Auxiliaries <sup>d</sup>	400	1357	309	1527	374	1508	475	1763	447	4085	744	5520	1136	6870	745	4749
Atk submarines	0	0	0	0	0	14	8	79								
SESS/SVRS				1391		972		772		1268						
Total	1788	1760	1315	3668	1246	3570	1347	3854	1445	8007 <sup>e</sup>	2233	9000 <sup>e</sup>	2608	12235 <sup>e</sup>	2058	6904 <sup>f</sup>

<sup>a</sup> Source: Ref. 9, p. 20, unless otherwise noted.

<sup>b</sup> Source: Ref. 2, p. 511.

<sup>c</sup> Source: Ref. 10, p. 22.

<sup>d</sup> Includes auxiliaries plus msc. aux/USSR Naval Assoc. Merships, AGS/AGOR, AGI.

<sup>e</sup> Soviet ship days spent in Bangladesh operations were approx. 1603 in 1972, 2522 in 1973, and 870 in 1974. Ship days spent in Strait of Gubal mineclearing operations in 1974 was approx. 1629.

<sup>f</sup> Ref. 7, p. 67, projects annual Soviet ship days in 1975 to 7366.

Table 3A

US ESTIMATES OF SOVIET SHIP-DAY: VARIATIONS<sup>a</sup>

	1970	1971	1972
	USSR	USSR	USSR
Variations in warship ship days			
Navy <sup>b</sup>	788	1028	2381
JCS <sup>c</sup>	1370	1190	3220
Variations in total ship days			
Navy <sup>b</sup>	3570	3854	8007
JCS <sup>c</sup>	4930	3970	8840
OSD <sup>d</sup>	4936	4023	8854

<sup>a</sup>The greatest discrepancy between the two sources is the total for Soviet warships.

<sup>b</sup>Ref. 9, p. 20.

<sup>c</sup>Ref. 2, p. 511.

<sup>d</sup>Ref. 7, p. 26.

Table 4  
UNITED STATES/SOVIET NAVY PORT CALLS IN THE INDIAN OCEAN

	1968		1969		1970		1971		1972		1973	
	United States	USSR	United States	USSR	United States	USSR	United States	USSR	United States	USSR	United States	USSR
Ethiopia	14	0	13	1	10	1	10	1	8	1	12	1
India	9	8	9	2	8	6	11	1	0	4	0	7
Iran	1	3	2	7	10	0	6	2	8	2	8	0
Iraq	0	3	0	8	0	2	0	11	0	14	0	16
Kenya	7	5	9	0	8	3	9	0	12	2	22	4
Kuwait	0	0	2	1	1	0	3	0	1	0	2	0
Malagasy Republic	6	0	5	1	7	0	13	0	11	0	19	0
Maldives	0	1	0	1	1	0	1	1	1	0	0	1
Mauritius	18	2	10	4	7	17	16	5	7	20	19	11
Pakistan	6	2	9	2	7	2	11	0	10	0	11	0
Seychelles Islands	6	0	6	0	3	0	9	0	6	3	10	0
Somalia <sup>1</sup>	1	3	0	13	0	18	2	11	0	38	0	97
South Yemen	0	4	0	13	0	7	0	13	0	12	0	7
Sri Lanka	3	4	6	8	3	2	4	2	10	14	10	9
Sudan	0	0	0	2	0	2	0	0	0	0	1	0
Tanzania	0	4	0	2	0	2	2	0	0	0	1	0
UAR (Port Suez)	0	3	0	1	0	0	0	0	0	0	0	0
Yemen	0	0	0	2	0	3	0	0	0	0	0	0
Total port calls per year	71	42	71	68	65	65	97	47	74	110	115	153

<sup>1</sup>The large increase in visits to Somali since 1971 reflects the USSR's development and use of the port of Berbera for naval support. Most of the remaining port visits in the Indian Ocean--particularly those by combatants--were taken for diplomatic purposes.

Note: "Port calls" reflect every entry of each Soviet naval ship into a foreign port but do not reflect the duration of the visits which varied from one day to 18 mo. Port calls by oceanographic research and space event support ships are included in the totals because the data available for 1968 through 1973 are not categorized by ship. Singapore is not included in the table because it is a Pacific Ocean port. However, Soviet ships from the Indian Ocean occasionally call there and Soviet naval auxiliaries are overhauled in Singapore's shipyards. In addition, ships engaged in long term harbor clearing operations in Bangladesh are not considered to be conducting routine port calls, and therefore are not included.

Source: Ref. 4, p. 159.

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Table 4A

## US/SOVIET PORT CALLS: VARIATIONS IN DATA

Data source	1968		1969		1970		1971		1972		1973	
	US	USSR	US	USSR	US	USSR	US	USSR	US	USSR	US	USSR
Navy <sup>a</sup>	71	42	71	68	65	65	97	47	74	110	115	153
DOD <sup>b</sup>			152	11	135	18	177	18 <sup>c</sup>	161	35	154	100 <sup>d</sup>

<sup>a</sup>Ref. 4, p. 159.

<sup>b</sup>Ref. 2, p. 511.

<sup>c</sup>SIPRI Yearbook, 1975 indicates 38 Soviet port calls were made in 1971 and a total of 162 for the 1968-1971 period (Ref. 1, p. 71).

<sup>d</sup>Admiral Grojean supplied data indicating Soviets made 150-160+ port calls in 1973 while the US made 175 calls (Ref. 2, p. 149).

and national interests. Political considerations will affect a country's stance on arms control. The point is simply that data can be found to support a variety of conflicting views regarding the significance of US/Soviet naval activity and the utility of arms limitations.

#### QUALITATIVE TRENDS/POTENTIAL AREAS FOR QUALITATIVE CONSTRAINTS

Qualitative indicators of trends in relative naval strength can include type of shipboard weaponry, availability of local bases and support facilities, capability to project power ashore, presence of aircraft, presence of nuclear-powered ships, and presence of strategic submarines.

(1) Soviet ships armed with antiship and air defense missiles have been deployed in the Indian Ocean since 1968. Because the US has no qualitatively similar antiship missile capability (Ref. 7, p. 69), the Soviets view these, in part, as a counterbalance to US nuclear-powered aircraft carriers. Any constraint on naval capabilities would have to consider this divergent nature of US and Soviet naval force composition.

(2) Availability of local bases and support facilities in the Indian Ocean are qualitative improvements to the degree that they are capable of prolonging staying power, thereby broadening naval options. Major disagreements arise when attempting to define "base" and the relationship between "bases" and modern naval missions and capabilities. Are Soviet "anchorage" in the Indian Ocean bases? Is Diego Garcia a "facility" or a "base?" The terms are used almost interchangeably, yet a "base" is more objectionable than "facility" to some opponents of the proposed expansion of military related activity on the island.

Aside from staying power, local support facilities may increase crisis management capability by enhancing each side's capability to monitor events. P-3 Orion long range patrol aircraft flying from Diego Garcia have an operating radius of about 1500 miles (with 3 hours on station). The proposed extension of the airfield at Diego Garcia can be used by KC-135 tanker aircraft and B-52 bombers on an emergency basis and, thus, is capable of supporting US strategic reconnaissance aircraft. (The New York Times [26 Dec. 1975] reported that "Navy men at Diego Garcia say there have been occasional visits from U-2 planes.") US Navy and DOD officials have argued that Diego Garcia "is essential to insure proper flexibility and responsiveness of US forces to national requirements in a variety of possible contingencies" (Ref. 13, p. 121). The absence of a suitable support facility on Diego Garcia would deny the US "the ability to contain (its) ...reaction by a measured and discreet application of force. (The US)...will be confronted with an all or nothing at all circumstance in which the only available reaction may be in excess of that necessary" (Ref. 7, p. 22).

Table 5

COMPARISON OF US AND SOVIET FACILITIES AT  
SOMALI AND DIEGO GARCIA

Soviet facilities <sup>a</sup>	US Facilities <sup>b</sup>
Communications Airfield - 13,000' - 15,000'	Communications Airfield - 8,000' (expansion planned to 12,000')
POL Storage 170,000 barrels	POL Storage 60,000 barrels (expansion planned to 380,000 barrels of aviation fuel and 320,000 barrels of ship fuel.
Harbor Facilities	Harbor Facilities (proposed)
Personnel/Housing facilities available for approxi- mately 1500 men	Personnel/Housing facilities available, currently 430 communications personnel and approx. 600 seabees con- structing the base. A total of 600 US personnel are expected to be sta- tioned on the island if proposed expansion is completed.
Missile storage and handling facility (ASMs and ship- board SSMs)	

<sup>a</sup>Ref. 7, p. 13-21.<sup>b</sup>Ref. 7, p. 9.

If Bahrain, Australia and South Africa are included in the discussion, the US had enjoyed naval bases in the region since shortly after the end of WWII. Diego Garcia is the first base not under the ultimate control of an indigenous state, but the island itself remains part of the British Indian Ocean Territory (BIOT). The Soviet base at Berbera, Somalia, is a relatively new development whose existence has been used by US advocates of expanding American facilities on Diego Garcia. Table 5 compares the facilities at Berbera and Diego Garcia. Table 6 lists the Indian Ocean bases manned and used by the US, UK, France and Soviet Union. (For map showing location of bases and anchorages see Fig. 2.)

(4) A capability to project power ashore — in the form of amphibious warfare ships and helicopter carriers — represents a qualitative improvement over the absence of such a capability. The threat posed by such a capability is not as relevant to direct US-Soviet naval confrontation as it is to the relationship between the US or Soviet Union and the littoral states. However, one Soviet author suggests that "It is not excluded that the helicopter as a fighting vehicle will be employed in cooperation with ships for destroying or even capturing enemy transports on the high seas..." (Ref. 14, p. 24). Soviet amphibious warfare ships first entered the Indian Ocean in 1969 and have remained ever since. In 1974 the Soviet helicopter carrier, Leningrad, was deployed to the Indian Ocean. US amphibious support ships were first deployed to the area in 1971.

Constraints on the deployment of ships with an amphibious warfare capability may have greater utility than constraints on other areas of qualitative improvements, particularly if the littoral states agree to participate. Removal of amphibious craft and their capability to put troops ashore does not completely remove US or Soviet capability to project power ashore (aircraft and shore bombardment remain). It does have the advantage of reducing the scope of this capability; and if sufficiently defined, identification and verification would not be so hard as with submarines. Nor would it require the superpowers significantly to reduce their capabilities relative to each other. It would reduce their capability to intervene physically, ashore. It would also, however, leave the Soviet Union at an advantage insofar as it could in some key areas introduce troops by air directly from Soviet territory while achieving resupply and replenishment by sea. The US could accomplish the same feat only with difficulty entailing mid-air refuelings of aircraft carrying airborne forces stages from the US.

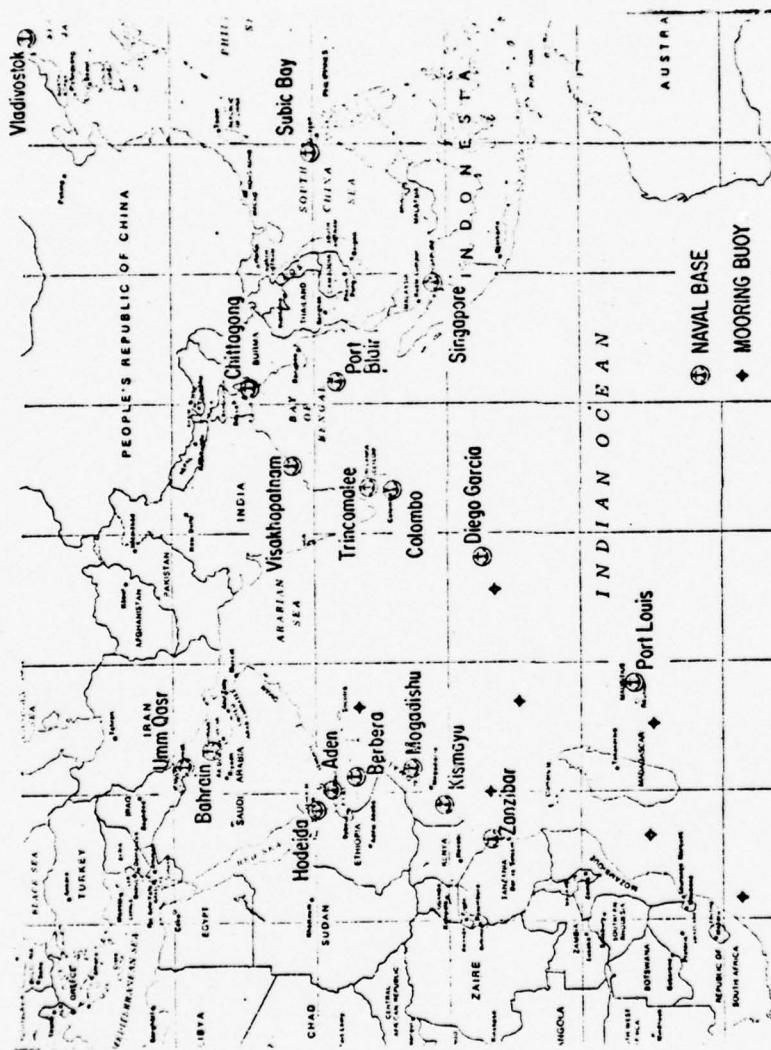
(5) Presence of aircraft on US aircraft carriers and Soviet shore bases is a qualitative improvement in force capability that may be perceived as a threat by the littoral states as well as the superpowers. The US has operated aircraft carriers in the Indian Ocean for some years, but never on a permanent basis. In 1971 (India-Pakistan War) and 1973 (Middle East War) carriers headed US task forces dispatched to the

Table 6

BASES MANNED AND UTILIZED BY US, UK, FRANCE AND USSR<sup>a</sup>

USSR:	Berbera, Somalia
US:	Diego Garcia, British Indian Ocean Territory
FRANCE:	Diego Suarez, Malagasy Republic; Djibouti, French Territory of Afars and Issas; Reunion Island, Comoro Islands
UNITED KINGDOM:	Gan Island, British Indian Ocean Territory; Mauritius Island, British Indian Ocean Territory.

<sup>a</sup>Ref. 7, p. 67.



Ref. 8, p. 11.

Fig. 2—Selected Naval Facilities

region. Although the Soviets do not have attack carriers comparable to those of the US, Admiral Gorshkov's praise of the effectiveness of carrier strike forces in local wars (Ref. 15), his more recent comments on the increasing role of aviation in naval warfare (Ref. 9, Nov. 74, p. 62), and the recent launching of the carrier Kiev, suggest that in the near future the Soviets will have an operational capability to employ carriers in the Indian Ocean in a variety of roles ranging from peacetime presence to projection of power ashore. As early as 1969 Gorshkov stated that "... one should not minimize the combat potential of aircraft carriers, ... especially when they are brought to bear against poorly armed countries." (The Current Digest of the Sov. Press, Vol. XXI, #31, 27 Aug. 1969, p. 22). However, the dependence of the US Navy on carriers for air support, the lack of US shore-based aircraft in the region and the relative difficulty of keeping track of Soviet shore-based aircraft are likely to militate against other reasons that would appear to make a constraint on naval aircraft attractive.

(6) Nuclear-powered ships are qualitatively superior to conventionally powered vessels due to their capability for continuous operation. The US has from time-to-time deployed nuclear-powered surface ships to the Indian Ocean. Soviet nuclear-powered hunter-killer submarines reportedly have been deployed to the area. Qualitative advantages of nuclear-powered aircraft carriers are largely nullified by the presence of conventionally powered vessels in the task force, which must refuel more frequently. Aircraft aboard the carrier also have conventional fuel requirements that limit the length of time the ship can operate without logistical support.

(7) The presence of US and Soviet submarines is more of a threat to US and Soviet interests than to the littoral states. The problem is two-fold — attack submarines and strategic ballistic-missile firing submarines (SSBN).

(a) Attack submarines increase the degree of threat to opposing naval forces and also threaten the sea LOCs not only of the superpowers, but also the littoral states. Reports of Soviet attack (hunter-killer) submarines in the Indian Ocean have been noted. Table 2 indicates the presence of US attack submarines on a small scale since 1971.

(b) SIPRI reports that "there is no direct evidence of actual deployment of sea-based strategic nuclear forces, that is, ballistic missile-firing nuclear-powered submarines in the Indian Ocean" (Ref. 1, p. 64). It is not inconceivable that US and Soviet strategic submarines have in fact been in the Indian Ocean. The ultra low frequency capability of the US communications network from Asmara, Ethiopia to Diego Garcia, in the Chagos Archipelago and Northwest Cape, Australia permit communication with submarines. The range of the current US strategic

SLBMs is great enough to reach Moscow from some parts of the Indian Ocean (see Table 4). Soviet SLBMs lack sufficient range to attack the US from the Indian Ocean, but may be directed against China. Submarines of both countries may well transit\* the Indian Ocean during periods of redeployment. And US SSBNs may occasionally patrol in the region (Ref. 4, p. 92).

The utility of constraints on SSBN deployments is dubious. First, verification of nuclear submarine activity is difficult to accomplish. Second, Indian Ocean deployments of US strategic submarines directed against the Soviet Union enhance the US deterrent threat by increasing the area from which Soviet targets can be hit. Concurrently, it reduces Soviet capability to detect these submarines by increasing the area to be searched by ASW forces. Table 7 indicates the range and area of operation permitted by current and future US SLBMs. Figure 3 indicates areas from which current and future US SSBNs may operate. (The February 1974 issue of *Seapower* stated that "classified messages to Polaris/Poseidon submarines deployed in the Indian Ocean are sent from the US communications facility in Australia at North West Cape)." (Ref. 4, p. 92).

#### PRINCIPAL INFLUENCES ON US/SOVIET NAVAL ACTIVITY

##### Soviet Interests

Factors influencing Soviet perceptions of their role in the Indian Ocean that have an impact on US/Soviet naval competition in the region are outlined below. Although the nature of the Soviet penetration of the area has been economic and political as well as military (Ref. 15, p. 51), the emphasis in this appendix is on the military aspects. Ultimately, Soviet naval activity appears motivated by the desire to gain a military advantage over the US and its Western allies, as well as over the PRC.

(1) Security of Soviet sea lines of communication (sea LOCs) between European and Asiatic Russia. Soviet spokesmen have been quick to point out that the Indian Ocean "is the only ice-free sea lane between the Soviet Union's western and eastern ports... It stands to reason that the build-up of Western 'military presence' in the Indian Ocean imperils Soviet sea communications" (Ref. 4, p. 210). The northern sea route through the Arctic is passable for only a few weeks each summer. The

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\*The major transit route between the Soviet western and Far Eastern fleets is the Indian Ocean. Obviously the Soviets would be unwilling to consider vessels in transit across the Indian Ocean as part of its "presence." Nevertheless, vessels, ostensibly "in transit" could become part of a Soviet surge capability during periods of crisis — and could be perceived as such by the US even in the absence of an actual Soviet intention.

only land route linking the western and eastern parts of the Soviet Union is the Trans-Siberian Railroad. The proximity of the railroad to the Chinese border leaves it extremely vulnerable to interdiction should a Sino-Soviet war erupt. Hence, Soviet military planners may perceive the Indian Ocean as vital to USSR capability to resupply and support Soviet Far Eastern forces. According to Australian Prime Minister Malcolm Fraser, "Russia has started to use the Suez Canal for her military vessels. Clearly they want to link up the Black Sea-Mediterranean fleet with the Pacific-Vladivostok fleet. And they can do it now." (Washington Post, 18 Feb. 1976).

(2) Secure sea LOCs throughout the Indian Ocean enhance Soviet capability to support its client states on the littoral during local wars (e.g., 1971 Indian-Pakistan War) which in turn increases Soviet participation in determining the outcome of these wars (e.g., 1973 Middle East War). A capability to support India in the context of a Sino-Soviet, Sino-Indian or India-Pakistan conflict must also be considered by the Soviets. A relevant lesson the Soviets may have gleaned from the 1973 Middle East war is the necessity of an adequate sealift capability to support local wars. Airlift alone cannot carry the volume of supplies required for intense or prolonged conflict.

(3) Japan, Australia and Western Europe proved extremely vulnerable to the 1973 Arab oil embargo. A Soviet presence capable of interrupting the transport of Persian Gulf oil either directly or indirectly would enhance Soviet influence over the political decisions of US allies. R. M. Paone has noted that the Soviets are "particularly attuned to control of strategic 'choke points' or access routes and are especially conscious of the strategic value of the Suez Canal, the Bab-El-Mandeb region, the Straits of Malacca, and the Somalia region... as a result, they have sought to gain positions which will allow them to monitor... the movements of... strategic materials that flow from that area to the free world" (Ref. 17, p. 30) (Fig. 4 - choke points). The phrase "if not control" could easily be added to the above with respect to Soviet interests in "monitoring" the movements of commercial traffic through Indian Ocean waters.

(4) Soviet naval presence may further be designed to offset US, Western European and Japanese economic influence in the region. From the perspective of the Indian Ocean littoral states, these are their major extra-regional trading partners. Unable to match Western and Japanese economic power at this time, the Soviets may perceive military activity as a short-term means of balancing economic activity, and as a prerequisite to economic penetration of the region.

(5) It has been estimated that by 1980 the Soviets could require as much as 260 million tons of imported oil. If Soviet planners have reached a similar conclusion, the Persian Gulf area may become an area

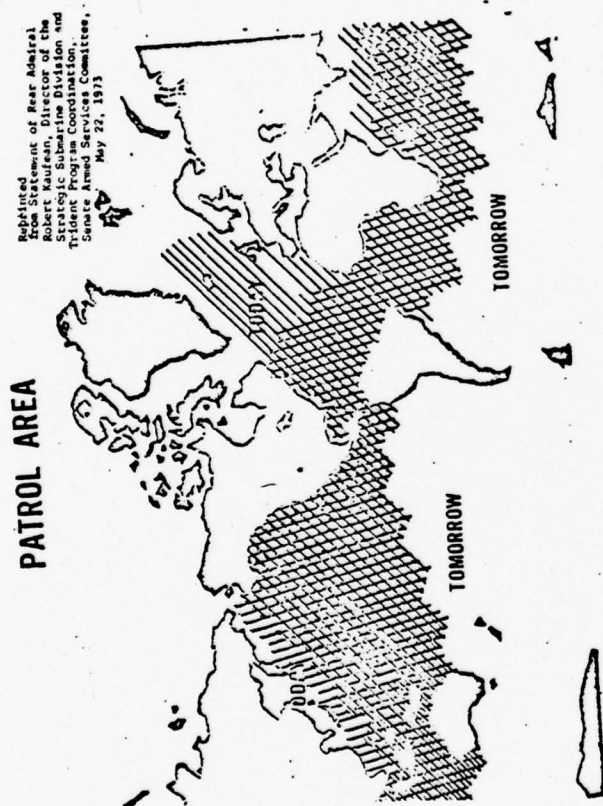
## ACDA/MEA-248 II

Table 7

US SLBMs

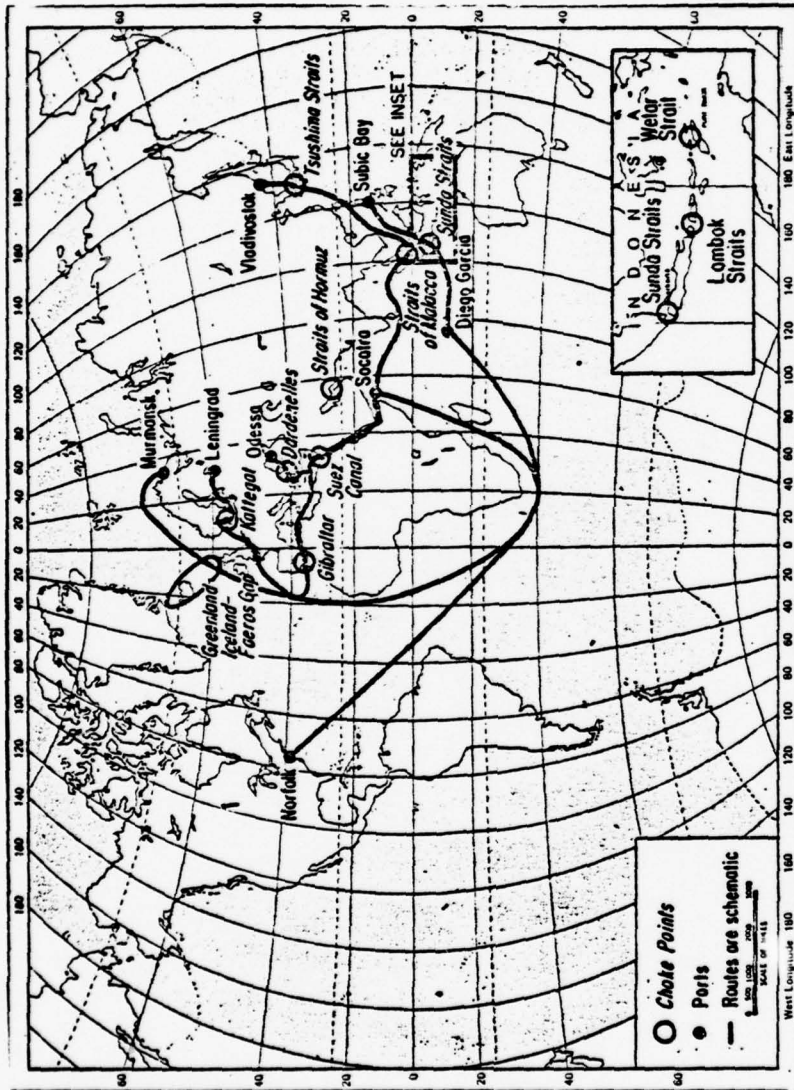
Missile	Range	Operational	Operational Area (millions of square miles)
Polaris/Poseidon	2200 nm	currently	3
Trident I	4000 nm	1978	15
Trident II	6000 nm	1980's	42

Ref. 16.



Ref. 4, p. 92.

Fig. 3—Potential US SSBN Operational Area



Ref. 8, p. 15.

Fig. 4—Major Sea LOC Choke Points

of significant rivalry. Adequate bases for conventional operations in the gulf as well as the Indian Ocean are thus a long-term consideration to ensure access to the oil fields in times of trouble (Ref. 18).

(6) The Indian Ocean has a potential role in Soviet submarine strategy. Soviet SSBMs operating in the Indian Ocean may be perceived by the Soviets as having an additional deterrent effect on the PRC. Denial of the Indian Ocean to US strategic ballistic missile submarines targeted against the Soviet Union, on the other hand, would increase Soviet political and military options to the extent that it reduces US deterrent capability.

(7) The political and economic influence of the PRC among Indian Ocean states has greatly increased in recent years, particularly along the East African littoral. "Chinese financial and technological support of the Tan-Sam Railroad, creation of a joint Chinese-Tanzanian shipping company, training of the Tanzanian Air Force by China, and the People's Republic assistance program in Kenya, Guinea, Sri Lanka, Zaire, and Mali" (Ref. 17, p. 31) as well as support of liberation movements in Rhodesia, Mozambique, Angola, South-West Africa, and South Africa, have caused considerable concern in the Soviet Union. A naval presence along the eastern littoral may be viewed by the Soviets as a viable means of countering Chinese initiatives (Ref. 18). Thus, US proposals for US/Soviet naval limitations in the Indian Ocean may be perceived by the Soviets as secondary to maintaining their naval options with regard to the PRC. The Soviets may also seek to preempt the US. In June 1971 a Soviet article focused on US base strategy in the Indian Ocean. "Recent reports have begun to appear in the Western press that US military circles are studying the question of constructing air and naval bases in the northern part of Mozambique ..." and specifically the possible US use of the Bay of Nacak. (The Current Digest of Sov. Press, Vol. XXIII, #19, 8 June 1971, p. 34).

(8) Admiral Gorshkov has emphasized the navy's peacetime role in furthering Soviet world-wide political goals. A navy "possesses the capability to vividly demonstrate the economic and military might of a country beyond its borders during peacetime." Political leaders employ navies "to show their readiness for decisive actions, to deter or suppress the intentions of potential enemies, as well as to support friendly states" (Ref. 11, Oct. 74, p. 59). There are some indications that not all Soviet leaders are as attuned to the virtues of naval power as Gorshkov. Only two admirals have been publicly identified on the Soviet general planning staff, and beyond the high-standing of the nuclear powered SLBM submarine forces, "... in any discussion of the Soviet armed forces as a whole, the navy is generally listed last..." (Ref. 15, p. 1167). Thus, internal bureaucratic considerations within the Soviet Union may also have an impact on Soviet responsiveness to any US Indian Ocean naval limitations proposals.

United States Interests

The US Congress has become increasingly interested in obtaining an Indian Ocean naval limitations agreement with the Soviet Union. In 1971, a House Foreign Affairs Committee investigation, responding to growing Soviet naval activity in the Indian Ocean, and the establishment of a US communications facility on Diego Garcia, concluded that: (1) the Indian Ocean may become the site of major power competition among the Soviet Union, PRC, Japan, and the US; (2) it was too early to make firm decisions about the nature and intensity of a US commitment to the region, but that Diego Garcia as a communication's center was an appropriate extension of US presence in the Indian Ocean; (3) the US should rely on diplomatic finesse rather than military power in dealing with the problems of the Indian Ocean; and (4) the future of the Indian Ocean is a proper subject for discussions between the US, the Soviet Union and perhaps Japan and China. Those conclusions have remained basically unaltered through the present and have become the basis for Congressional opposition to the further expansion of Diego Garcia and US naval presence in the Indian Ocean (Ref. 19, p. iv - v).

Since 1973, when the Navy proposed expanding its existing facility on Diego Garcia from its present status as a communications facility (approved by Congress in 1970) into an "austere" logistical support facility, the island has been the center of a US policy controversy over the Indian Ocean. Administration and Congressional arguments are amply documented in the numerous hearings. Briefly, the main opposition to expansion of Diego Garcia justifies its position on grounds that: (1) it will lead to creation of an (expensive) Indian Ocean fleet; (2) the littoral nations are opposed to the expansion; (3) it will lead to future US involvement and another Vietnam; (4) it will lead to a superpower naval arms race in the Indian Ocean; and (5) it will have a destabilizing influence on the area which in turn will reduce the chances for a negotiated arms limitations agreement with the Soviets.

The US has two primary interests in the Indian Ocean beyond the possible enhancement of its strategic deterrent if SSBNs were deployed to the region.

(1) Security of the sea LOCs from the Persian Gulf region to Western Europe and Japan (Ref. 6, p. 2115, 2116). The proposal to expand Diego Garcia was motivated by the military, political and economic realities that emerged from the October 1973 Middle East War and the subsequent Arab oil embargo.

The embargo revealed not only the full extent of economic dependence of our allies on imported oil, but the political and military ramifications of "economic warfare" for future US strategy. US estimates of the Arab ability to coordinate and maintain an embargo, as well as estimates

of Western European and Japanese capability to withstand pressures generated by the embargo, proved shortsighted. Even if arguments are accepted that point to the oil cutoff as an indigenous Arab political decision unmotivated by the Soviet Union and not subject to US military pressure, it is conceivable that in the future the Soviet Union could employ dominant naval power in the region to exert pressure on local governments to repeat the oil embargo. Also, it is conceivable, given the locations of Soviet facilities at strategic positions around the major sea lanes transiting the Indian Ocean, that in times of crisis the presence of strong Soviet naval forces will influence political decisions by US allies by threatening occupation of Persian Gulf oil-fields or even the interdiction of tanker traffic.

(2) The US has an interest in maintaining a credible naval presence to balance Soviet activity in the region. The absence of US military forces in the region may be interpreted by indigenous states friendly to the US as a lack of interest. This in turn may compel them to seek to accommodate the USSR, or PRC, much like Thailand is attempting to accommodate the USSR, PRC and DRV in the wake of the US withdrawal from South-east Asia. To the extent that the US military posture in the Indian Ocean is perceived by the USSR as lack of interest, or lack of resolve to deter their activity, Soviet commitments and involvement are apt to increase:

Whether Soviet naval forces possess a truly global combat capability at this point is not as important as their ability to operate effectively within Moscow's chosen sphere of influence and interest. If the Kremlin's interests continue to expand as they have in the recent past, Soviet naval capabilities will expand proportionately. Any failure to match commitments with capabilities would come about over the strong objections of the naval leadership (Ref. 15, p. 1174).

Despite opposition from some members of Congress, the US appears to be moving towards limited expansion of naval facilities on Diego Garcia. As required under provisions of the recently enacted War Powers Act, President Ford certified the necessity of the proposed logistic support facility to US national security. A Senate resolution (Resolution 160) to disapprove construction was defeated in June 1975, but funding for the project was also delayed and Congress requested that the administration enter into arms restraint negotiations with the Soviet Union with a view toward keeping the Indian Ocean "an ocean of peace" (Ref. 20).

On the one hand, it seems unlikely that the Soviets would consider reducing their naval activity in the Indian Ocean in return for a US commitment not to do what it has not yet done—namely, develop Diego Garcia. Future US naval deployments do not depend on the further

development of Diego Garcia, but would be more easily accomplished and more economically supported by the base. On the other hand, the Soviets already have a comparatively well-developed base infrastructure in the Indian Ocean. Thus, the USSR may perceive an agreement limiting development of US logistic support capabilities as furthering Soviet strategic interests while strengthening the position of those in the US who oppose a US presence in the Indian Ocean.

#### COMPETITION AMONG THE LITTORAL STATES

Although there have been, and continue to be, a variety of tensions between states of the Indian Ocean region, the absence of significant capabilities for projection of seapower leaves little or no potential for major military conflict on land or at sea between non-neighboring countries (Ref. 21). While constraints on air and ground armaments must be approached on a narrower scale (e.g., African littoral, Middle East, South Asia, Southeast Asia), naval limitations may be considered in terms of the entire Indian Ocean littoral.

Indigenous navies share a number of common features: they are small; they are primarily coastal control forces; and they generally command the least priority, in terms of personnel, in the armed forces of their respective countries. Table 8 indicates trends in the size and composition of these navies since 1964.

Indonesia, Australia and India have the largest navies indigenous to the region. Since 1966-67, when President Sukarno was removed from power, Indonesian priorities have focused more on internal matters than on external affairs. Nevertheless, Indonesia has not abandoned all territorial claims against neighboring countries, including the Philippines (with which the US has defense commitments). Due to the loss of maintenance support, including spare parts resupply, from the USSR and PRC (the major suppliers of its naval equipment until 1966-67), as well as the renewed focus on internal affairs, the Indonesian naval capabilities have deteriorated to a point where their ability to perform a regional function is at best questionable.

While Australia has a relatively large and modern deepwater navy, it lacks sufficient capability to counterbalance Soviet seapower, or protect Western shipping interests in the Indian Ocean unaided. The development of a new naval base at Cockburn Sound in Western Australia, scheduled for completion in 1978, demonstrates Australia's interest in maintaining a Western presence in the region. The new base will be available to US, UK, and possibly French naval forces operating in the Indian Ocean.

India used its navy successfully against Pakistan during the 1971 India-Pakistan War (Ref. 4). It already has a limited sea lift capability

Table 8  
DISTRIBUTION OF NAVAL VESSELS

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	Ships 1964										Navy Personnel 1970										Navy Personnel 1975												
	CV	C	SS	DD	FR	CO	LF	CV	C	SS	DD	DE	FR	CO	LF	CV	C	SS	DD	FR	DE	CO	LF	CV	C	SS	DD	FR	DE	CO	LF		
Australia	2			4	4		12.5	1		4	12 <sup>a</sup>	1				17.4								1		4	8 <sup>a</sup>	6			17	16.2	
Indonesia	1	6 <sup>b</sup>	8	12	15	63	35		1	6	5		11	18	63	40.0										3	0	12			16	25	
India	1	2		3	8	5	16		1	2	4	3	8		19	40.0								1	2	8	3	23			25 <sup>c</sup>	30.0	
Sri Lanka					1	2	n.a.						1		23	n.a.												1			28	2.4	
Bangladesh							none									none																6	.5
Burma					2	2	49	n.a.					2	4	76	6.25											2 <sup>d</sup>			4	76	7.0	
Pakistan				5	2	2	4			3	5		2		4	9.5										3 <sup>e</sup>	4				14	10.0	
Thailand				6	14	9	21.5						14	21	21.5	21.5												7 <sup>f</sup>			14	298	
Malaysia				1		10	2.1					1		28	3.25	3.25												1 <sup>h</sup>			33 <sup>i</sup>	4.8	
Singapore							none								2	.5															13	2	
Kenya							none								3	.25															4 <sup>j</sup>	.35	
Ethiopia						5	n.a.								9	1.4															9	1.5	
Somalia							none								10	.25															12	.3	
Tanzania						5	none								4	.1															6	.6	
South Africa				2	6	5	3.5								7	.3															8	.6	
																															k	4	4

ACDA/MEA-248 II

Ref. 22 and 23.

<sup>a</sup> Includes 3 DDG.

<sup>b</sup> 14, but only 6 operational, 6 in reserve, 2 for spare parts.

<sup>c</sup> 6 missile boats, 8 more on order.

<sup>d</sup> 1 converted to a minelayer.

<sup>e</sup> One more on order.

<sup>f</sup> 3 new replaced 2 old.

<sup>g</sup> 3 more on order.

<sup>h</sup> 1 new; 1 old converted to trainer.

CV = aircraft carrier; C = cruiser; SS = submarine; DD = destroyer, CO = corvette; FR = frigate; LF = light forces (patrol boats, fast attack craft, gunboats, etc.)

n.a. = not available.

<sup>i</sup> 3 more - missile armed - on order.

<sup>j</sup> 3 more on order.

<sup>k</sup> 6 on order.

which would permit conduct of amphibious operations against such weaker states as Sri Lanka and Bangladesh, as well as Pakistan. Furthermore, SIPRI suggests that India will soon overtake and surpass Australia as the strongest navy power indigenous to the region (Ref. 1). The development of a substantial projection capability by India could lead lesser powers, particularly those along the northern littoral as well as Iran in the Middle East, to seek quantitative and qualitative improvements in their own naval capabilities.

Since 1969 there has been a trend among littoral state navies toward the acquisition of "light forces." These vessels are generally smaller, faster, and less expensive than ships acquired during the 1945-1965 period. The trend in armament for these ships is toward anti-ship and anti-aircraft missiles (Tables 9 & 10). It is not known whether this is a self-imposed trend, or whether some of the countries might desire more modern, deep-water capabilities but lack necessary funds, ship-building capabilities and naval armaments industries, or can't find a foreign supplier who will give them what they want on favorable terms. However, the trend does reflect the predominantly defensive orientation of indigenous navies. Anti-ship missiles may be offensive as well as defensive, but the absence of a capability to project these missile-armed boats much beyond territorial waters suggests a defensive intent. Furthermore, if there is a deep-water threat, it is perceived by the littoral states as coming from navies of external powers. Given this perception, the demonstrated effectiveness of anti-ship missiles, and the high cost of naval hardware, local navies may view missiles as a relatively inexpensive means of qualitatively improving their defensive capabilities.

A number of factors may influence the feasibility of naval limitations among Indian Ocean littoral states:

(1) Local navies have three basic functions — provide national defense against aggression, protect coastal trade routes, and maintain internal security (e.g., deny use of waterways to insurgents, smugglers, etc.). Small, fast patrol boat type vessels with modern armaments (torpedoes, missiles, guns) would be sufficient to accomplish these missions.

(2) Whatever the reason, there is a current trend toward smaller ships, which may be exploitable for arms control purposes. Furthermore, the cost of building a navy capable of protecting major Indian Ocean international trade routes is beyond the current means of any littoral state.

Table 9  
DISTRIBUTION OF GUIDED MISSILES  
(1945-1965)<sup>a</sup>

Recipient	Missile	Donor	Approx. Date of Del.	Approx. Number
Pakistan	Sidewinder Cobra	US FRG	(1958-64) <sup>b</sup> 1965	150
India	SA-2 Guideline (Atoll)	USSR (USSR)	1965 (1963)	(102) (36)
Indonesia	SA-2 Guideline Kennel Styx* Atoll Entac	USSR USSR USSR USSR Fr.	(1961-63) (1962-63) (1961-65) (1964-65)	(6) (150) (72) (168) (200)
Thailand	Sidewinder	US	(1961-62)	200
S. Africa	AS-20/30 (Matra R.530) Sidewinder	Fr. (Fr.) US	(1965-66) (1963) (1956)	(60) (96) 200

<sup>a</sup>Ref. 24.

<sup>b</sup>Data in parens ( ) from Ref. 25.

\*Shipboard antiship missile.

Table 10  
DISTRIBUTION OF GUIDED MISSILES  
(1965-1975)<sup>a</sup>

Recipient	Missile	Donor	Approx. Date of Del.	Approx. Number
Pakistan	Matra R-530	Fr.	1968	72
India	Short Tigercat*	UK	1972-73	40 systems
	SA-2 Guideline	USSR	1968-72	75
	Atoll	USSR	1966-73	1660
	AS 30	Fr.	1968	50
	Entac <sup>b</sup>	Fr.	1969	50
	SS-11 <sup>b</sup> *	Fr.	1969, 1971-73	50, 750
	Styx*	USSR	1971-72	96
	Short Seacat <sup>c</sup> *	UK	1972	20
	SA-6	USSR	On order	
Thailand	Short Seacat*	UK	1973	12
	Hawk	US	1969-70	36
	(Gabriel) <sup>d</sup> *	(Israel)	(On order)	
S. Africa	Matra R.550	Fr.	On order	
	Crotale/Cactus	Fr.	(1972)	(18)
	(Entac)	(Fr.)	(1975)	
	Tigercat	UK <sup>e</sup>	1974	(54)
	(Exocet)*	(Fr.)	(On order)	
Somalia	SA-2	USSR	(1974)	
Malaysia	Seacat*	UK	1971	20
	SS-12	FR	1971	96
	Exocet*	FR	1973	40
Singapore	Gabriel*	Israel	1972	36
	Bloodhound	UK	1971	56
	Rapier	UK	1973	24
Indonesia	Entac	Fr.	1968	200

<sup>a</sup>Ref. 25.

<sup>b</sup>Produced under license in India.

<sup>c</sup>100 more on order.

<sup>d</sup>Data in parens ( ) for the Military Balance series, IISS, Ref. 22.

<sup>e</sup>Sold by Jordan.

\*Shipboard antiship or antiaircraft missiles.

(3) The Soviet Union has generally refrained from equipping its client states in the region with a capability to project naval power. With the exception of its early support to Indonesia, which received a Soviet cruiser, 14 submarines, seven destroyers, and seven frigates in the early 1960s, the Soviet Union has generally limited transfers of warships to "light forces" — i.e., patrol craft, including missile-armed Osa/Komar fast attack craft.\*

Thus, a limited basis for qualitative constraints of naval armaments in the region already exists: i.e., the US and USSR apparently share an interest in retaining the coastal defense and customs orientation of local naval forces in the region (excepting Australia). Whether self-imposed or not, indigenous navies are limited to few warships larger than frigates; and the recent trend is toward small naval craft. Limitations on the acquisition of transport, supply, and amphibious warfare vessels as well as larger deepwater warships would continue the present lack of a capability among the littoral states to project power. Concurrently, permitting the acquisition of antiship missiles for use only on small patrol craft having relatively short radii of operation would enhance the overall defensive capability of indigenous navies.

There are two levels to this problem: agreement among the littoral nations themselves, and an agreement among the major suppliers of naval armaments. (Tables 11 and 12 indicate sources of major weapons to the region.) Any agreement would have to include both levels. An agreement among suppliers of naval armaments would amount to an imposed limit on indigenous navies because of their current dependence on external sources for the equipment to develop a capability to project seapower. However, if a nation such as India should decide to build up its navy to complement its A-bomb capability, an imposed agreement could only delay, not prevent, the development.

Problems associated with constraints on air forces and ground combat equipment are more complex due to the existence of indigenous capabilities to project air and land power into neighboring countries and the imbalance in populations, armaments, and resources among the littoral states. Key issues having an impact on attempts to obtain region-wide limitations on air and ground force equipment include: India's relationship with Pakistan and PRC, Soviet/PRC supported communist insurgencies in Southeast Asia, Soviet/PRC activity in Africa, Black Africa's relationship with South Africa as well as the national objectives of each country along the Indian Ocean littoral that may cause it to feel threatened by one or more of its neighbors.

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\*By 1975, however, India has received eight Soviet submarines and eleven frigates.

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Table 11  
SOURCES OF MAJOR WEAPONS  
(1945-1965)<sup>a</sup>

Recipient	Jet Aircraft <sup>b</sup>	Missiles	Warships <sup>c</sup>	Tanks	(AFV/APC) <sup>d</sup>
South Asia					
Burma	UK		UK	UK	(UK)
Sri Lanka	US		UK (Italy) <sup>e</sup>	UK	(UK)
India	USSR, UK, Fr.	USSR	UK	USSR, UK, Fr., US	(UK)
Pakistan	US, (UK), FRG	US, FRG	UK, US	US, PRC	(US, UK)
East Asia					
(Malaysia)			(UK)		(UK)
Indonesia	USSR	USSR, Fr.	USSR, Italy	FR., USSR	(UK)
Thailand	US	US	UK, US	US	(US)
Sub-Sahara Africa					
(Malagasy)			(Fr., FRG) <sup>e</sup>		(Fr.)
S. Africa	UK, Fr., Can.	US, Fr.	UK	UK	(UK)
Somalia	USSR			(UK)	(USSR, UK)
Ethiopia	US			US	(US)

<sup>a</sup>Ref. 24, unless otherwise indicated.

<sup>b</sup>Includes fighters, light bombers and jet trainers.

<sup>c</sup>Does not include patrol type craft unless indicated.

<sup>d</sup>Data in parens ( ) is from Ref. 25.

<sup>e</sup>Patrol craft.

Table 12  
SOURCES OF MAJOR WEAPONS  
(1965-1975)<sup>a</sup>

Recipient	Combat Aircraft	Missiles	Warships <sup>b</sup>	Tanks	AFV/APC
South Asia					
Burma	US, Can.		US		UK
Sri Lanka	USSR		UK, PRC		USSR, UK
India	USSR, UK	USSR, Fr., UK	USSR, UK	USSR, UK, Czech	Czech
Pakistan	PRC, FRG, Fr., US	FRG, Fr.	UK, Fr., PRC	PRC, USSR	US
Bangladesh	USSR		India	USSR	
East Asia					
Malaysia	Australia, US	FR., UK	UK, Fr.		US, Fr.
Indonesia	Australia, US	Fr.	Australia, US		
Thailand	US	US, UK	US, UK	US	US, UK
Singapore	US, UK	UK, Israel	UK, FRG, US	Fr. <sup>c</sup>	US
Sub-Sahara Africa					
Malagasy			Fr.		
S. Africa	Fr., Italy	Fr., UK	Fr., Port- ugal	UK	Fr. <sup>d</sup>
Somalia	USSR		USSR	USSR	USSR
Ethiopia	US		US		Fr.
Kenya	UK		UK		UK, Fr.
Tanzania	PRC		PRC	PRC	USSR

<sup>a</sup>From Ref. 25.

<sup>b</sup>Includes patrol craft.

<sup>c</sup>French AMX-13s sold by Israel.

<sup>d</sup>Produced under license by S. Africa.

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Acquisition of modern antiaircraft and antitank missiles like anti-ship missiles, has been increasing among the armed forces of the littoral states. Therefore, it may be attractive to apply qualitative and quantitative constraints on major armaments, such as jet aircraft, tanks, and armored fighting vehicles, while leaving procurement of fixed-site SAMs and infantry AT missiles qualitatively unconstrained. Such an agreement would be feasible: (1) if the agreement is not externally imposed, (2) if it maintains or enhances a nation's capability to provide internal security, (3) if it increases the risk of failure to aggressors, and (4) if it is perceived by the littoral states as an effective, low-cost means of meeting some of their national security needs.

### CONCLUSIONS

(1) The Indian Ocean region may be viewed as an entity only in the context of seapower and sea LOCs.

(2) Given the nature of US and Soviet interests in the region, it is unlikely that either country would significantly reduce its naval deployments. Increased naval activity will continue to occur during periods of local instability.

(3) Qualitative constraints on naval deployments would have little impact on reducing US/Soviet competition in the Indian Ocean, but would merely rechannel the competition. At best qualitative and quantitative constraints must be considered together and in light of opposing missions, strategy, tactics, and intentions.

(4) Constraints on amphibious warfare and helicopter ships may be feasible as a means of reducing US and Soviet capability to project power ashore. Qualitative constraints on the deployment of US SSBNs to the Indian Ocean may reduce overall US strategic deterrent capability. Limiting areas of operation of SSBNs increases their vulnerability to detection by Soviet ASW forces.

(5) Constraints on naval armaments in littoral state navies may be feasible due to the low priority afforded by indigenous states to their navies, the defensive orientation of these navies, an existing trend toward smaller warships, and an apparent shared interest by the US and USSR in limiting the capabilities of local navies to coastal defense.

(6) Qualitative constraints on the type and size of support, transport, and supply ships, as well as warships, with the absence of such constraints on the acquisition of anti-ship missiles may have utility in discouraging regional naval arms competition.

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